

## MODULE DESCRIPTION

Module code	<b>Z-ZIP2-592z</b>
Module name	<b>Systemy wspomaganie decyzji i zarządzania wiedzą.</b>
Module name in English	<b>Decision Support and Knowledge Management Systems</b>
Valid from academic year	<b>2016/2017</b>

## A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	<b>Management and Production Engineering</b>
Level of education	<b>2nd degree</b> <i>(1st degree / 2nd degree)</i>
Studies profile	<b>General</b> <i>(general / practical)</i>
Form and method of conducting classes	<b>Full-time</b> <i>(full-time / part-time)</i>
Specialisation	<b>All</b>
Unit conducting the module	<b>The Department of Production Engineering</b>
Module co-ordinator	<b>Małgorzata Lucińska, PhD</b>
Approved by:	

## B. MODULE OVERVIEW

Type of subject/group of subjects	<b>Basic</b> <i>(basic / major / specialist subject / conjoint / other HES)</i>
Module status	<b>Compulsory</b> <i>(compulsory / non-compulsory)</i>
Language of conducting classes	<b>English</b>
Module placement in the syllabus - semester	<b>2nd semester</b>
Subject realisation in the academic year	<b>Winter semester</b> <i>(winter semester/ summer)</i>
Initial requirements	<b>No requirements</b> <i>(module codes / module names)</i>
Examination	<b>Yes</b> <i>(yes / no)</i>
Number of ECTS credit points	<b>4</b>

<b>Method of conducting classes</b>	<b>Lecture</b>	<b>Classes</b>	<b>Laboratory</b>	<b>Project</b>	<b>Other</b>
<b>Per semester</b>	<b>30</b>		<b>15</b>	<b>15</b>	

### C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

<b>Module target</b>	Ability to use decision support systems and knowledge management methods in a company. Application of artificial intelligence methods as traditional techniques supplement in the decision support.
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Effect symbol	Teaching results	Teaching methods (l/c/lab/p/other)	Reference to subject effects	Reference to effects of a field of study
W_01	A student knows structure, operation and application of expert systems.	l	K_W04 K_W11 K_W12	T2A_W03 T2A_W05 S2A_W06
W_02	A student understands concepts and ways of applying neural networks and other techniques of machine learning.	l/lab	K_W04 K_W11 K_W12	T2A_W03 T2A_W05 S2A_W06
W_03	A student has a knowledge concerning structure and application of decision trees and other knowledge representation systems.	l	K_W04 K_W11 K_W12	T2A_W03 T2A_W05 S2A_W06
U_01	A student is able to design and built a simple expert system with the help of the Aitech Sphinks package.	l/lab/p	K_U06 K_U09 K_U11	T2A_U09 T2A_U10 T2A_U14 T2A_U07 S2A_U04
U_02	A student is able to create a simple neural network using the Aitech Sphinks package.	l/lab/p	K_U06 K_U09 K_U11	T2A_U09 T2A_U10 T2A_U14 T2A_U07 S2A_U04
U_03	A student can apply in practice a knowledge representation of decision trees.	l/lab/p	K_U06 K_U09 K_U11	T2A_U09 T2A_U10 T2A_U14 T2A_U07 S2A_U04
K_01	A student understands the necessity of continuously improving his/her knowledge.	l/lab/p	K_K01	T2A_K01 T2A_K06

#### Teaching contents:

##### 1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Artificial intelligence methods – introduction.	W_01 W_02 W_03 K_01
2	Knowledge representation methods.	W_03 U_03
3	Machine learning - definitions, examples, and applications.	W_02 W_03 U_02 U_03 K_01
4	Expert systems - principles and structure.	W_01 U_01
5	The process of creating expert systems.	W_01

		U_01
6	Application of expert systems to decision support.	W_01 U_01 K_01
7	Decision trees - structure and principles.	W_03 U_03
8	An algorithm of decision tree induction - calculation of information gain.	W_03 U_03
9	Decision trees - the process of pruning.	W_03 U_03
10	An artificial neuron - structure and the process of learning.	W_02 U_02
11	Structure and operation of linear perceptron.	W_02 U_02
12	Structure and operation of neural networks with a hidden layer.	W_02 U_02
13	Application of neural networks.	W_02 U_02 K_01
14	Knowledge management in an enterprise.	W_03 U_03 K_01
15	Elements of fuzzy logic in knowledge representation.	W_03 U_03 K_01

## 2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module

## 3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module
1	Building an expert system with the help of the application PCShell AITECH SPHINKS.	W_01
2	Using the application CAKE AITECH SPHINKS in the process of creating an expert system.	U_01
3	Designing a neural net with the help of the application Neuronix AITECH SPHINKS.	K_01
4	Optimization of structure, parameters, and the process of learning of neural networks.	W_01
5	Creating a decision tree with the help of the application DeTreex AITECH SPHINKS	U_01
6	The process of decision tree pruning.	W_02
7	Hybrid systems - integration of neural networks and expert systems using the AITECH SPHINKS package.	U_02

## 4. The characteristics of project assignments

Design and implementation of an expert system, applied to decision support processes in an enterprise.

## The methods of assessing teaching results

Effect symbol	<b>Methods of assessing teaching results</b> <i>(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)</i>
W_01	Two tests during the semester and an examination.
W_02	Two tests during the semester and an examination.
W_03	Two tests during the semester and an examination.
U_01	Creating an expert system.
U_02	Design of a neural network.
U_03	Design of a decision tree.
K_01	Observation of a student during classes, discussion.

## D. 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)	3
5	Participation in project classes	15
6	Project tutorials	3
7	Participation in an examination	2
8		
9	<b>Number of hours requiring a lecturer's assistance</b>	<b>68</b> <i>(sum)</i>
10	<b>Number of ECTS credit points which are allocated for assisted work</b> <i>(1 ECTS point=25-30 hours)</i>	<b>2.5</b>
11	Unassisted study of lecture subjects	10
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	5
14	Unassisted preparation for laboratories	5
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	10
18	Preparing for an examination	10
19		
20	<b>Number of hours of a student's unassisted work</b>	<b>40</b> <i>(sum)</i>
21	<b>Number of ECTS credit points which a student receives for unassisted work</b> <i>(1 ECTS point=25-30 hours)</i>	<b>1.5</b>
22	<b>Total number of hours of a student's work</b>	<b>108</b>
23	<b>ECTS points per module</b> <i>1 ECTS point=25-30 hours</i>	<b>4</b>
24	<b>Work input connected with practical classes</b> <i>Total number of hours connected with practical classes</i>	<b>56</b>
25	<b>Number of ECTS credit points which a student receives for practical classes</b> <i>(1 ECTS point=25-30 hours)</i>	<b>2</b>

## E. LITERATURE

Literature list	<ol style="list-style-type: none"> <li>Mulawka J., <i>Systemy ekspertowe</i>, WNT, Warszawa 1996.</li> <li>Lula P., <i>Metody sztucznej inteligencji i ich zastosowanie w zarządzaniu</i>, Wydawnictwo Akademii Ekonomicznej, Kraków 2007.</li> <li>Kwiatkowska A., <i>Systemy wspomagania decyzji. Jak korzystać z wiedzy i informacji</i>, PWN, Warszawa 2007.</li> <li>Documents for AITECH DSS package.</li> <li>Mitchell T., <i>Machine Learning</i>, McGraw Hill, 1997.</li> </ol>
Module website	