FACULTY W-8 / DEPARTMENT……

SUBJECT CARD

Name in Polish: Podstawy inżynierii wiedzy
Name in English: Foundations of Knowledge Engineering
Main field of study (if applicable): Computer Science
Specialization (if applicable): Computer Engineering (CE)
Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*
Kind of subject: obligatory / ~~optional~~ / ~~university-wide~~*
Subject code INZ0139Wc
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	30			
Number of hours of total student workload (CNPS)	90	90			
Form of crediting	Examination / ~~crediting with grade~~*	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	3	3			
including number of ECTS points for practical (P) classes		3			
including number of ECTS points for direct teacher-student contact (BK) classes	1,8	1,8			

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of logics, set theory, probability theory, graph theory.

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SUBJECT OBJECTIVES

C1 Acquiring understanding of issues related to using computers in solving engineering problems concerning knowledge.

C2 Developing skills in formulating mathematical models based on available knowledge or data, in designing solution algorithms to analysis and decision problems, and in application of existing software tools.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Student can define a knowledge representation (KR) using relations or logical formulas, and formulate analysis problem (AP) and decision problem (DP) based on these KRs.

PEK_W02 Student can explain specific concepts of knowledge validation and updating devoted to a relational KR and to a logical KR.

PEK_W03 Student can characterize the process of knowledge discovery in databases and define several data mining problems and methods useful in knowledge acquisition.

relating to skills:

PEK_U01 Student is capable of applying knowledge processing algorithms for solving AP and DP.

PEK_U02 Student is capable of applying knowledge validation and updating algorithms to relational and logical KRs.

PEK_U03 Student knows how to process data so as to discover knowledge, and how to use existing software to carry out this task.

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec1	Introduction. Main problems of knowledge engineering. Classical mathematical models vs. knowledge representations (KRs).	2
Lec2, Lec3	Relational KR.	4
Lec4 – Lec6	Logical KR. Issues on computational complexity.	6
Lec7, Lec8	Probabilistic uncertainty in logical KR – probabilistic reasoning and Bayesian networks.	4
Lec8, Lec10	Validation and updating of a relational knowledge KR.	3
Lec10, Lec11	Automated knowledge extraction from large data sets. Knowledge discovery in databases. Attributes' domains discretization and other data mining problems.	2
Lec11 – Lec13	Association rules.	4
Lec13, Lec14	Decision trees.	3
Lec15	Data clustering.	2
	Total hours	30

Form of classes - class		**Number of hours**
Cl1 – Cl6	Solving example problems of mathematical modeling with the use of knowledge representations, solving analysis and decision making problems based on knowledge representations.	12

Cl7 – Cl10	Numerical examples on knowledge validation and updating. Logical KR, Bayesian networks, relational KR. Using software tools.	7
Cl10 – C11	Mining data for association rules - numerical example, computer simulations.	3
Cl12, Cl13	Mining data for decision trees - numerical example, computer simulations.	4
Cl14	Mining data for clusters - numerical example, computer simulations.	2
Cl15	Test	2
	Total hours	30

Form of classes - laboratory		**Number of hours**
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Lab 5		
…		
	Total hours	

Form of classes - project		**Number of hours**
Proj 1		
Proj 2		
Proj 3		
Proj 4		
…		
	Total hours	

Form of classes - seminar		**Number of hours**
Sem 1		
Sem 2		
Sem 3		
…		
	Total hours	

TEACHING TOOLS USED
N1. Traditional lecture. N2. Students' individual work – solving computational exercises. N3. Students' individual work – programming. N4. Students' individual work – performing computer simulations. N5. Students' individual work – studying literature.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester	Educational effect number	Way of evaluating educational effect achievement

end)		
F1 (lecture)	PEK_W01 – PEK_W03	Examination
F2 (classes)	PEK_U01 – PEK_U03	Observation of students' activity during classes, test
P1 (lecture and classes as per GK)	PEK_W01 – PEK_W03, PEK_U01 – PEK_U03	(2*F1 + F2) / 3, F1, F2> 2

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1]
[2]
[3]
[4]

SECONDARY LITERATURE:

[1] P. Adrians, D. Zantige "Data mining", Addison-Wesley, 1996
[2] T. Mitchell "Machine Learning", McGraw-Hill, 1997
[3] Z. Bubnicki "Modern Control Theory", Springer Verlag, 2005
[4] N. T. Nguyen "Advanced Methods for Inconsistent Knowledge Management", Springer Verlag, 2007

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Foundations of Knowledge Engineering
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Informatyka
AND SPECIALIZATION Computer Engineering

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 (knowledge)	K2INF_W02	C1	Lec1 – Lec6	N1, N5
PEK_W02	K2INF_W02	C1	Lec7 – Lec10	N1, N5
PEK_W03	K2INF_W02	C1	Lec10 – Lec15	N1, N5
PEK_U01 (skills)	K2INF_U05	C2	Cl1 – Cl6	N2 – N5
PEK_U02	K2INF_U05	C2	Cl7 – Cl10	N2 – N5
PEK_U03	K2INF_U05	C2	Cl10 – Cl14	N2 – N5

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above