(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: ARTIFICIAL INTELLIGENCE	**2. Course code**
3. Validity of course description: 2012/2013	
4. Level of studies: 1st cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: MACROFACULTY	(FACULTY SYMBOL) RAU3
7. Profile of studies: general	
8. Programme:	
9. Semester: 5	
10. Faculty teaching the course: Institute of Electronics, RAu3	
11. Course instructor: Ewa Straszecka, PhD, DSc	
12. Course classification: common	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: Course attendants are supposed to have general knowledge concerning computers and computer applications. They have either be able to use at least one high level programming language or an advanced numerical tool like e.g. Matlab. It is assumed that students passed the following courses: Fundamentals of Computer Programming, Theory of Computer Science.	
16. Course objectives: Aim of the study is to give a definition and a review of AI, its history and present problems together with more careful investigation in selected areas. They are: knowledge representation,; automatic reasoning – schemes and certainty factors, fuzzy reasoning; expert systems – knowledge base and inference engine, chaining rules and other techniques of inference; languages: natural language representation and AI languages; fuzzy identification; neural networks; genetic algorithms; emotion modeling. A student has a chance to learn practical implementations of the methods during laboratory work.	
17. Description of learning outcomes:	

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	A student is provided with knowledge of certainty measures, mathematical methods used in AI and methods based on artificial neural networks.	Control questions during lecture (score evaluation)	Classical and multi-medial lecture	
2.	A student knows principles of applications of computer programs and algorithms in information processing and analysis as well as in knowledge representation	Control questions during lecture (score evaluation)	Classical and multi-medial lecture	
3.	A student is acquainted with conditions of creating neural networks and genetic algorithms in computer environments	Control questions during lecture (score evaluation)	Classical and multi-medial lecture	
4.	A student is able to obtain knowledge from data	Evaluation of numerical results of exercises	Laboratory exercises	
5.	A student is able to divide problem into tasks that are realized by several members of a knowledge-engineering team.	Evaluation of an exercise report	Laboratory exercises	
6.	A student is able to prepare a documentation of a problem solution and to formulate conclusions	Evaluation of an exercise report	Laboratory exercises	

7.	A student is able to collaborate with several members of a team to evaluate common conclusions on data driven knowledge	Discussion with students	Laboratory exercises	

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

lecture - 30 h., lab. exercises - 30 h

19. Syllabus description:

Semester 5 :

Lecture

Definition of artificial intelligence. Methods of AI problems representation. Representation of knowledge – classical and new methods. Schemes of reasoning. Reasoning with certainty measures. Fuzzy reasoning. Chaining rules. Expert systems in technical and medical diagnosis support. A review of AI computer languages. Natural language processing and its use in databases. Fuzzy sets in signal identification and control. Neural networks in signal processing. Clustering methods. Genetic algorithms in solving problems. Emotion modelling – aim and methods.

Laboratory exercises

1. KOHONEN NETWORKS – TP
2. ECG MODELLING BY GENETIC ALGORITHMS – part I- function optimisation
3. ECG MODELLING BY GENETIC ALGORITHMS – part II- ECG analysis
4. NEURAL NETWORKS IN SIGNAL PROCESSING
5. MEDICAL DIAGNOSIS SUPPORT SYSTEM part I – basic probability assignment calculation
6. MEDICAL DIAGNOSIS SUPPORT SYSTEM part II – inference, incomplete data management
7. HEURISTIC CONCEPTS IN FUZZY SETS INTERPRETATION
8. EMOTION MODELING
9. EVOLUTIONARY STRATEGIES IN OPTIMIZATION PROBLEMS – part I – software preparation
10. EVOLUTIONARY STRATEGIES IN OPTIMIZATION PROBLEMS – part II – properties evaluation
11. ANT SYSTEMS - part I – software preparation
12. ANT SYSTEMS - part II – properties evaluation

20. Examination: no examination

21. Primary sources:

R.J. Schalkoff "Artificial Intelligence - An Engineering Approach", McGraw-Hill Publishing Company 1990.
S. Russel, P. Norvig "Artificial Intelligence. A Modern Approach", Pearson Education Inc. 2003, and new editions
P.H. Winston "Artificial Intelligence", Addison Wesley, Publishing Company 1993

22. Secondary sources:

Cawsey „The Essence of Artificial Intelligence", Prentice Hall Europe 1998
M. Negnevitsky "Artificial Intelligence – a Guide to Intelligent Systems" Pearson Education Ltd.2002

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/20
2	Classes	0/0
3	Laboratory	30/30
4	Project	0/0
5	BA/ MA Seminar	0/0
6	Other	10/15
	Total number of hours	70/65

24. Total hours:135

25. Number of ECTS credits: 4

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 2

26. Comments:

Approved:

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(date, Instructor's signature) (*date , the Director of the Faculty Unit signature)*