(*faculty stamp*)



**COURSE DESCRIPTION**

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|---|---|
| **1. Course title: EXPERT SYSTEMS** | **2. Course code** |
| **3. Validity of course description:** 2012/2013 | |
| **4. Level of studies:** MSc programme | |
| **5. Mode of studies:** intramural studies | |
| **6. Field of study**: AUTOMATICS AND ROBOTICS | (FACULTY SYMBOL)AEII |
| **7. Profile of studies: : academic** | |
| **8. Programme:** | |
| **9. Semester: 1** | |
| **10. Faculty teaching the course: Institute of Automatic Control, Rau1** | |
| **11. Course instructor**: dr hab. inż. J. Figwer prof. Pol. Śl. | |
| **12. Course classification: compulsory course** | |
| **13. Course status:** compulsory | |
| **14. Language of instruction:** English | |
| **15. Pre-requisite qualifications: : It is assumed that student is familiar with a basic logic, probability and statistics, programming methods and control theory.** | |
| **16. Course objectives: Expert systems are decision support systems that are a part of artificial intelligence. The aim of the course is to give students basic knowledge concerning expert systems and knowledge engineering.** | |

**17. Description of learning outcomes:**

| Nr | Learning outcomes description | Method of assessment | Teaching methods | Learning outcomes reference code |
|---|---|---|---|---|
| 1. | The student knows the concept of expert systems and their functional and informatics structure. | SP | WT | K_W17, K_K02 |
| 2. | The student knows the methods of knowledge acquisition and representation. | SP | WT | K_W03 |
| 3. | The student knows exact and uncertain methods of forward and backward inference. | SP | WT | K_W14 |
| 4. | The student can acquire and code knowledge in a knowledge base and use shell expert systems. | SP | WT, WM, P | K_U01, K_K03 |
| 5. | The student can design inference systems for shell based expert systems. | OP | P | K_U09, K_U18 |
| 6. | The student is able to present and defend the proposed solution to a given problem in the field of expert systems. | OP | P | K_U04 |

**18. Teaching modes and hours**

**Lecture: 15 / BA /MA Seminar: 0 / Class: 0 / Project: 15 / Laboratory: 0**

**19. Syllabus description:**

**Lecture:**

The course on Expert Systems concerns the following topics: artificial intelligence – history, definition, foundations, basic ideas and state of the art; knowledge representation and methods of knowledge acquisition; expert system definition, functional and informatics structure of expert system; areas of expert system application; knowledge bases and their structure; inference systems, user's interface; facts and rules; Horn's clauses; problems with rule based knowledge representation; exact and uncertain, forward

and backward chaining inference; modus ponens rule and closed world assumption; algebra of certainty factors; inference with certainty factors; fuzzy rules and fuzzy inference; software realisation of inference systems; knowledge acquisition in examples: system modeling, identification methods, design of single- and multi-channel control systems, optimal and adaptive control, programming methods, numerical integration, optimization methods, multiprocessor systems, agent systems, combinatorial problems, signal sampling and reconstruction, digital filter design.

**Project:**
Project is conducted in parallel with lectures. The students build shell-based expert system focusing on knowledge acquisition, rule-based knowledge representation and inference system.

**20. Examination:** no

**21. Primary sources:**

1. P. Harmon, R. Maus, W. Morrissey, Expert systems tools and applications, John Wiley & Sons, 1988.
2. G. F. Luger, W. A. Stubbefield, Artificial Intelligence: Structures for Complex Problem Solving, Addison Wesley Longman, 1999.
3. A. Niederliński, rmes Rule- and Model-Based Expert Systems, Jacek Skalmierski Computer Studio 2008.
4. S. J. Russell, P. Norvig, Artificial Intelligence: A Modern Approach. Prentice Hall, 2003.

**22. Secondary sources:**

1. M. Meystel, J. S. Albus, Intelligent Systems. Architecture, Design and Control, John Wiley & Sons, 2002.
2. J. Mulawka, Systemy ekspertowe, WNT Warszawa 1996.
3. W. Cholewa, W. Pedrycz, Systemy doradcze, Wydawnictwo Politechniki Śląskiej, 1987.

**23. Total workload required to achieve learning outcomes**

| Lp. | Teaching mode : | Contact hours / Student workload hours |
|---|---|---|
| 1 | Lecture | 15/15 |
| 2 | Classes | 0/0 |
| 3 | Laboratory | 0/0 |
| 4 | Project | 15/15 |
| 5 | BA/ MA Seminar | 0/0 |
| 6 | Other | 5/5 |
| | Total number of hours | 35/35 |

**24. Total hours:** 70

**25. Number of ECTS credits:** 3

**26. Number of ECTS credits allocated for contact hours: 1**

**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)*