Expert systems - course description

General information

Course name	Expert systems
Course ID	11.3-WE-INFD-ExpSyst-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Computer Science
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	3
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	• dr inż. Robert Szulim

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

Aim of the course

To familiarize with the basics of construction, operation and types of expert systems.

To familiarize with the different methods of artificial intelligence, types of knowledge bases and foundations of their creation.

To form basic skills in designing, building and running expert systems.

Prerequisites

Principles of programming, Algorithms and data structures.

Scope

Ideas of the modelling of intellectual acts of the man. Intelligent systems and their differentiation. Artificial intelligence tendencies. Interpretation of notions information, knowledge.

Expert systems. Structure of expert system. Categories of expert systems. Properties of expert systems. Expert systems design. Methods of the expert system design.

Knowledge acquisition. Knowledge acquisition from experts. Knowledge acquisition from databases.

Knowledge base of expert system. Rule representation of the knowledge. Knowledge base design. Knowledge base verification.

Exact knowledge evaluation in expert systems. Forward reasoning. Backward reasoning.

Cases based reasoning.

Machine learning. Notions and definitions. Strategies of machine learning

The interface of the communication the user-the system. Graphic user interface. Dialogue design. Explanations system.

Approximate representation of the knowledge. Forms of knowledge uncertainty. Fuzzy sets basics.

Approximate knowledge processing. Fuzzyfication and defuzzyfication. Fuzzy reasoning. Other forms of artificial intelligence General characterization of artificial neural networks.

General characterization of genetic algorithm. The evolution of systems of artificial intelligence.

Hybrid structures. Development tendencies. Selected tools and program libraries for building expert systems.

Integration of expert systems with control-measurement systems, databases and WWW.

Teaching methods

Lecture, consultation, laboratory exercises, team work, discussion.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form

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Can build and run a simple expert system and integrate it with other systems		• a test with score scale • carrying out laboratory reports	• Laboratory
Can design a knowledge base for the expert system		• a test with score scale • carrying out laboratory reports	• Laboratory
Has the basic knowledge in the area of the construction, operation and types of expert systems		• an evaluation test	• Lecture
Knows and understands chosen AI methods and can identify selected areas of their application		• a test with score scale • carrying out laboratory reports	• Laboratory
Is aware of the growing role of the systems based on the application of AI methods.		• an evaluation test	• Lecture

Assignment conditions

Lecture - the main condition to get a pass are sufficient marks in written or oral tests conducted at least once per semester.

Laboratory – a condition of the credit is the obtainment of affirmative estimations all laboratory exercises.

Calculation of the final grade: lecture 40% + laboratory 60%

Recommended reading

1. Hand D., Mannila H., Smyth P.: Principles of Data Mining, MIT Press, 2001

2. Siler W., Buckley J., Fuzzy Expert Systems and Fuzzy Reasoning, John Wiley & Sons, 2005

3. Larase D.: Discovering Knowledge in Data. An Introduction to Data Mining, John Wiley & Sons, 11 lut 2005

4. Giarratano J., Riley G., Expert systems: principles and programming, Thomson Course Technology, 2005

Further reading

1. Gallant S., Neutral network learning and expert systems, MIT Press, 1993

2. Korbicz J., Koscielny J., Kowalczuk Z., Cholewa W. Fault Diagnosis: Models, Artificial Intelligence, Applications, Springer-Verlag, 2004

3. Schalkof R., Intelligent Systems: Principles, Paradigms and Pragmatics, Joness and Bartlet, 2011

Notes

Modified by dr inż. Robert Szulim (last modification: 14-07-2021 12:15)