# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Knowledge Engineering** | | **1010335441010330400** |

| Field of study | Profile of study (general academic, practical) | Year /Semester |
|---|---|---|
| **Information Engineering** | **(brak)** | **2 / 4** |
| Elective path/specialty | Subject offered in: | Course (compulsory, elective) |
| **Information Technologies** | **polish** | **obligatory** |

| Cycle of study: | Form of study (full-time,part-time) |
|---|---|
| **Second-cycle studies** | **part-time** |

| No. of hours | | | | | No. of credits |
|---|---|---|---|---|---|
| Lecture: **16** | Classes: **-** | Laboratory: **16** | Project/seminars: **-** | | **5** |

| Status of the course in the study program (Basic, major, other) | (university-wide, from another field) |
|---|---|
| **(brak)** | **(brak)** |

| Education areas and fields of science and art | ECTS distribution (number and %) |
|---|---|
| **technical sciences** | **5 100%** |

## Responsible for subject / lecturer:

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Student has a knowledge of advanced programming techniques and methods. |
| 2 | **Skills** | Student can model and analyse computing systems; when formulating and solving computer problems, he/she can integrate the knowledge from different domains and fields of science. |
| 3 | **Social competencies** | Student can think and work creatively and enterprisingly. |

## Assumptions and objectives of the course:

providing students with: the knowledge of different formal methods of knowledge representation (both certain and uncertain) and different techniques of knowledge acquisition, including - machine learning; the ability to design and implement small expert systems.

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. Student has an organized and theoretically grounded knowledge of data integration and exploration. - [K_W07]
2. Student knows problems of knowledge engineering and the methods of their solving. - [K_W09]

### Skills:

1. In a team, a student can design and implement particular modules of non-standard or complex information systems. - [K_U09]
2. Student can propose and justify improvements of the existing information solutions. - [K_U12]

### Social competencies:

1. Student realises the necessity to inform general public about achievements of computer science and other aspects of computer engineers - [K_K02]

## Assessment methods of study outcomes

Lecture: written exam consisting of theoretical questions and simple problems to solve.

Labs: rating a student's solution of a group project task (oral report, implementation in an appropriate programming language/environment, written specification); rating a student's activity in class discussions and solving lab problems.

More than 50% points are necessary for passing the exam and labs.

## Course description

Lectures. The notions of data, information and knowledge. Main rules of knowledge engineering. Sources of knowledge and classical techniques of knowledge acqusition. Methods of certain and uncertain knowledge representation. Reasoning methods. Machine learning algortithms. Expert systems and their usage in diagnostics, classification, construction, prediction and simulation. Medical expert systems.

Labs. Programming environments for developing expert systems (CLIPS, FuzzyCLIPS, JESS, NEURONIX, NETICA). Designing and implementing small expert systems with certainty/uncertainty.

## Basic bibliography:

1. Rutkowski L., Metody i techniki sztucznej inteligencji, wydanie 2, Wydawnictwa Naukowe PWN, 2009.
2. Jagielski J., Inżynieria wiedzy, Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, 2005.
3. Russell S.J., Norviq P., Artificial Intelligence: A Modern Approach (3rd edition), Prentice Hall, 2010.

## Additional bibliography:

1. Ligęza A., Foundations for Rule-Based Systems, Springer Series: Studies in Computational Intelligence, 2006.
2. Tadeusiewicz R., Sieci neuronowe, Akademicka Oficyna Wydawnicza RM, Warszawa 1993.
3. Techniki informacyjne w badaniach systemowych (red. Kulczycki P., Hryniewicz O., Kacprzyk J.), WNT, 2008.
4. Giarratano J.C., Riley G.D., Expert Systems: Principles and Programming (4th Edition) , PWS Publishing Company, 2004.

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Lectures | 16 |
| 2. Labs | 16 |
| 3. Final exam and consultations | 18 |
| 4. Preparing for labs | 14 |
| 5. Expert system architecture - literature study and design | 16 |
| 6. Expert system implementation | 20 |
| 7. Preparing for the final exam | 25 |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 125 | 5 |
| Contact hours | 75 | 2 |
| Practical activities | 50 | 2 |