# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Artificial intelligence** | | **1010331461010331100** |

| Field of study | Profile of study (general academic, practical) | Year /Semester |
|---|---|---|
| **Information Engineering** | **(brak)** | **3 / 6** |
| Elective path/specialty | Subject offered in: | Course (compulsory, elective) |
| **-** | **polish** | **obligatory** |

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

| No. of hours | | | | | No. of credits |
|---|---|---|---|---|---|
| Lecture: **2** | Classes: **-** | Laboratory: **1** | Project/seminars: **-** | | **4** |

| 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** | **4 100%** |

## Responsible for subject / lecturer:

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

| | | |
|---|---|---|
| 1 | **Knowledge** | Student has an elementary mathematical knowledge including algebra, analysis, logic and probability theory; she/he has basic skills in algorithm design and implementation. |
| 2 | **Skills** | Student is able to find information from professional literature, databases and other sources; he/she can also integrate and correctly interpret the gained information and then to conclude and formulate his/her own opinions; a student is able to work individually and in a team; he/she can estimate a time for a given task and prepare a schedule for it. |
| 3 | **Social competencies** | Student understands the necessity and knows possibilities of lifelong learning and improving the professional, personal and social competencies; a student realises the responsibility for his/her work done individually or in a team; he/she is also ready to accept the rules of group work. |

## Assumptions and objectives of the course:

providing students with the scope of artificial intelligence - basic problems, their models and methods of solving; presentation of exemplary applications of artificial intelligence.

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

### Knowledge:

1. Student has theoretical and practical knowledge on algorithm design and analysis, on abstract data structures and their implementation and on computationally hard problems - [K_W04]
2. Student has theoretical and practical knowledge on artificial intelligence and on expert and multi-agent systems - [K_W09]

### Skills:

1. Student is able to create engineer work documentation and to prepare text with the work result discussion - [K_U03]
2. Student is able to apply programming environments and platforms to develop, execute and test simple programs implemented in imperative, object-oriented and declarative languages - [K_U10]
3. Student is able to design and develop a simple expert or multi-agent system - [K_U13]

### Social competencies:

1. Student realises the social role of being a technical graduate, in particular he/she understands the need to convey his/her professional knowledge to the others in an understandable way, also using mass media - [K_K06]
2. Student understands the importance of a thorough design of a given project, respecting notation standards, using a proper language and keeping deadlines - [K_K07]

## Assessment methods of study outcomes

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

Labs: rating a student's activity during exercises; evaluation of the progress on the semestral task including the delivery of reports on time.

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

## Course description

Lecture. Introduction to artificial intelligence. Knowledge representation and knowledge processing - first-order logic and its subclasses. Solving problems by searching. Constraint satisfaction problems. Basis of automated reasoning. Expert system architectures. Incompleteness of knowledge - nonmonotonic and temporal reasoning. Truth maintenance systems. Machine learning. Neural networks.

Labs. Exercises encompassing advanced declarative programming techniques. Moreover, every student obtains one semestral task concerning expert systems, simple reasoning systems, constraint satisfaction problems, program transformation, two-person games or logic puzzles.

## Basic bibliography:

1. An introduction to Neural Networks, Kröse B., Van der Smagt P., University of Amsterdam, 1996
2. Artificial Intelligence: A Modern Approach, Russell S.J., Norvig P., Prentice Hall, New Jersey, 2003
3. Introduction to Machine Learning, Nilsson N. J., Stanford University, 1998
4. Logic, Programming and Prolog, Nilsson U., Małuszyński J., 2 ed, 2000
5. Fitting M., First-Order Logic and Automated Theorem Proving, 2 ed, Springer-Verlag, 1996.
6. The Handbook of Applied Expert Systems, Liebowitz J., CRC Press, 1997

## Additional bibliography:

1. Artificial Intelligence: A New Synthesis, Nilsson N.J., Morgan Kaufmann Publ., 1998
2. Concepts, Techniques, and Models of Computer Programming, Roy P. van, Haridi S., MIT Press, 2004
3. The Art of Prolog. Advanced programming techniques, Sterling L., Shapiro E., 2 ed, MIT Press, 1999
4. Systematic Introduction to Expert Systems, Puppe F., Springer-Verlag, 1993

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Lectures | 30 |
| 2. Labs | 15 |
| 3. Consultations and the exam | 5 |
| 4. Preparation to labs, preparing the reports | 30 |
| 5. Preparation to the exam | 20 |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 100 | 4 |
| Contact hours | 50 | 2 |
| Practical activities | 50 | 2 |