GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2016-2017

Artificial Intelligence (E016330)

Course size *(nominal values; actual values may depend on programme)*

Credits	**6.0**	**Study time**	**180 h**
Contact hrs	52.5 h		

Course offerings and teaching methods in academic year 2017-2018

A (semester 1)	seminar: practical PC room classes	7.5 h
	lecture	37.5 h
	seminar	15.0 h

Lecturers in academic year 2017-2018

Pizurica, Aleksandra	TW07	lecturer-in-charge

Offered in the following programmes in 2017-2018	crdts	offering
Bridging Programme Master of Science in Industrial Engineering and Operations Research	6	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	6	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Master of Science in Business Engineering (main subject Data Analytics)	6	A
Master of Science in Business Engineering (main subject Finance)	6	A
Master of Science in Business Engineering (main subject Operations Management)	6	A
Master of Science in Biomedical Engineering	6	A
International Master of Science in Biomedical Engineering	6	A
Master of Science in Biomedical Engineering	6	A
Master of Science in Industrial Engineering and Operations Research	6	A
Master of Science in Computer Science Engineering	6	A
Master of Science in Computer Science Engineering	6	A
Master of Science in Industrial Engineering and Operations Research	6	A

Teaching languages

English

Keywords

knowledge representation, reasoning under uncertainty, Bayesian networks, Hidden Markov Models, belief propagation, deep learning, rational agents and rational decisions, visual intelligence.

Position of the course

The course gives an overview of the principles and modern approaches in artificial intelligence. The focus is on intelligent agents, reasoning under uncertainty, and making rational decisions.

Contents

- Solving problems: Search (graph-based, local, informed), Game playing, Constraint satisfaction.
- Knowledge representation and reasoning: Logical agents, First-order logic, Resolution, Semantic networks, Planning and Acting.
- Uncertainty: Bayesian networks, Hidden Markov Models and other Graphical models,

Inference, Belief propagation, Viterbi algorithm, MCMC samplers, Probabilistic reasoning over time.
- Rational decisions: Utility and preferences, Maximizing expected utility, Value of information, Decision networks.
- Learning: Decision Tree Learning, Inductive learning (classification), Artificial Neural Networks, Deep learning (autoencoders, deep belief networks).
- Perception: Sensory processing in the brain, Computational models of visual perception, Visual intelligence.

Initial competences

Principles of predicate logic and probability theory

Final competences

1 Know and apply search strategies for complex problem solving.
2 Know and apply principles of logic deduction and reasoning, and techniques for action planning.
3 Structure and represent knowledge with predicates, rules, semantic networks, description logic.
4 Know and apply principles of reasoning under uncertainty, using Bayesian networks and other graphical models, including Hidden Markov Models and dynamic networks.
5 Know and apply basic principles of inductive learning and reasoning.
6 Make rational decisions by combining probability and utility theories.
7 Understand basic elements of computational models of sensor processing and inteligent visual perception.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, seminar, seminar: practical PC room classes

Extra information on the teaching methods

Classroom lectures; Classroom problem solving sessions; Computer-assisted problem solving

Learning materials and price

Slides with notes available (free of charge) on Minerva. Recommended book: S. Russel and P. Norvig, "Artificial Intelligence - A Modern Approach" (2010)

References

- S. Russel, P. Norvig, Artificial Intelligence, A Modern Approach, Second Edition, Prentice Hall (2010)
- J. Pearl, Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference, Morgan Kaufmann Publishers, Inc (1988)
- M. Negnevitsky, Artificial Intelligence: A guide to Intelligent Systems, Pearson (2011)

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination, report

Examination methods in case of periodic evaluation during the second examination period

Written examination, report

Examination methods in case of permanent evaluation

Report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

During examination period: written exam partly closed-book (theory), partly open-book (problem solving)
During semester: graded lab session reports (3)

Calculation of the examination mark

Written exam counts for 2/3 and lab session work for 1/3 of the final grade, provided that both parts are above given minimum requirements as follows:

- written exam is at least 9/20 and its both parts (theory and problem solving) are above 8/20;
- the average of lab session reports is at least 9/20.

If these conditions are not met and the total score is still 10/20 or above, the final grade will be brought to the highest non-passing grade (9/20).
Failing to participate in one or more parts of the evaluation results in the non-passing final grade.