

Artificial Intelligence (C003756)

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

Credits 6.0

Study time 180 h

Course offerings and teaching methods in academic year 2026-2027

A (semester 1)

English

Gent

lecture

seminar

Lecturers in academic year 2026-2027

Kobak, Dmitry

WE02

lecturer-in-charge

Offered in the following programmes in 2026-2027

[Bachelor of Science in Computer Science](#)

crdts

6

offering

A

Teaching languages

English

Keywords

Knowledge representation and inference, machine learning, neural networks and deep learning, natural language processing

Position of the course

Artificial intelligence (AI) is the study of solutions for problems that are difficult or impractical to solve with traditional methods. It is used pervasively in support of everyday applications such as email, word-processing and search, as well as in the design and analysis of autonomous agents that perceive their environment and interact rationally with the environment. The solutions rely on a broad set of general and specialized knowledge representation schemes, problem solving mechanisms and learning techniques. They deal with sensing (e.g., speech recognition, natural language understanding, computer vision), problem-solving (e.g., search, planning), and acting (e.g., robotics) and the architectures needed to support them (e.g., agents, multi-agents).

The study of Artificial Intelligence prepares the student to determine when an AI approach is appropriate for a given problem, identify the appropriate representation and reasoning mechanism, and implement and evaluate it.

Contents

Introduction to AI

- History of AI
- Turing Test
- Applications of AI today
- Ethical aspects of AI

Knowledge representation and inference

- Bayesian networks:
 - (conditional) independence
 - inference
 - d-separation
- Bayesian classifiers
- Markov models
- Hidden Markov models (Viterbi algorithm)
- Reinforcement learning

Neural networks

- introduction to supervised learning
- Backpropagation

- Auto-encoders
- Deep neural networks
- Generative AI

Interacting with the environment

- Natural language processing
 - Basics of speech recognition
 - Hidden Markov Models for ASR
 - Deep learning for NLP
 - Transformer models
 - Applications of NLP
- Explainable AI

Basics of Robotics

- Computer vision (basics)
- Simultaneous localization and mapping (SLAM)

Initial competences

Starting competences include a good knowledge of data structures and algorithms, basics of probability and statistics, programming in Python

Final competences

- 1 Describe Turing test and the Chinese Room thought experiment. [Familiarity]
- 2 Differentiate between the concepts of optimal reasoning/behavior and human-like reasoning/behavior. [Familiarity]
- 3 Determine the characteristics of a given problem that an intelligent system must solve. [Assessment]
- 4 Formulate a problem specified in natural language (e.g., English) as a constraint satisfaction problem and implement it using a chronological backtracking algorithm or stochastic local search. [Usage]
- 5 Make a probabilistic inference in a real-world problem using Bayes' theorem to determine the probability of a hypothesis given evidence. [Usage]
- 6 Identify examples of classification tasks, including the available input features and output to be predicted. [Familiarity]
- 7 Explain the difference between inductive and deductive learning. [Familiarity]
- 8 Describe over-fitting in the context of a problem. [Familiarity]
- 9 Describe how AI techniques can be made more interpretable

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

Seminar, Lecture

Study material

Type: Handouts

Name: Lecture material'

Indicative price: Free or paid by faculty

Optional: no

Additional information: Lecture material will be made available through Ufora

References

"Artificial Intelligence: A Modern Approach" (3rd edition) Stuart Russell and Peter Norvig ISBN-13: 978-0136042594

Course content-related study coaching

Personal contact with the lecturer, by e-mail or by appointment

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Oral assessment, Skills test, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark

The exact distribution of points between continuous assesment and the final examination, and the minimum requirements for each component in order to pass the overall course, will be announced at the beginning of the semester.