GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

AI Research Seminar (E031800)

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

Credits 3.0 **Study time 90 h**

Course offerings in academic year 2024-2025

A (semester 1)	English	Gent

Lecturers in academic year 2024-2025

De Bie, Tijl	TWO6	lecturer-in-charge
Kang, Bo	TWO6	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Computer Science	3	A
Master of Science in Computer Science Engineering	3	A
Exchange Programme in Computer Science (master's level)	3	A

Teaching languages

English

Keywords

Research, Artificial Intelligence, Machine Learning, generative AI, Data Science, Natural Language Processing, Computer Vision, Intelligent Agents, Robotics, Expert systems

Position of the course

Research in classical as well as new fields within the broad domain of Artificial Intelligence is rapidly growing, with numerous contributions every month both from the academic world and from industrial research organizations. Keeping track of the main trends and selecting contributions to study in depth is not obvious.
The goal of this course is to give students experience in critically following up and filtering recent AI research publications, as well as in processing and presenting them, with particular attention to the possibilities (and limitations) of very recent developments (e.g., in generative AI).
This course will be part of the list of elective courses for the Major in AI within the Master of Science in Computer Science Engineering.

Contents

- The course consists of different main parts:
  (1) introductory lectures,
  (2) expert presentations,
  (3) literature selection, and
  (4) in-depth presentations by students.
  Given the flipped classroom setting of parts (3) and (4), the number of lectures devoted to each part depends on the number of registered students.
- **Part (1): introductory lecture(s):**
  The purpose of the course will be explained, with a map of the AI research landscape (sub-areas and the most important conferences and journals), with some guidelines on how to follow up on AI, and how to critically read and present AI research papers.
- **Part (2): expert presentation(s):**
  Invited AI experts will present some of the most recent advances in the field. Given the extremely rapid evolution in AI, the topic of these lectures cannot be determined long in advance. However, advances in the domain of generative AI (GenAI) are likely candidates, due to the recently increased public

access to powerful GenAI applications.

- **Part (3): literature selection:**
  In groups of 2 to 3, students will be instructed to explore recent AI literature, along a number of pre-selected topics. The students will make a choice of up to 3 candidate (narrow) subdomains, to be pitched to their peers in a flipped classroom setting. The selected papers must be timely and of high quality (e.g., published as full-length papers in recent editions of top conferences such as ICML, NeurIPS, KDD, AAAI, IJCAI, ACL, EMNLP, NAACL, RSS, ICRA, IROS, ICCV, IJCAI, ECAI, ECML-PKDD, and others subject to approval, or top AI journals). The chosen topics must differ from the topic of the Master thesis.
  Besides more fundamental research directions (e.g., advances in energy-based models, or techniques for model de-biasing), there should also be an applied research direction, related to one of the expert presentation topics, and for which open source resources are available (e.g., retrieval-augmented generation). For that topic, the students will pitch their own idea for a potentially innovative application.
  In consultation with the students, the lecturers will decide on one topic to be prepared for an in-depth presentation in Part (4).
- **Part (4): in-depth presentations by students:**
  Each group of students will present their selected topic, in an in-depth presentation. In case the applied topic was selected, this will involve presenting a small-scale demo application.
- After each in-depth presentation, each student submits a short assessment, providing:
  - a summary of top methodological novelty / main contribution in the presented work,
  - and a peer-assessment in the form of anonymous constructive qualitative feedback along different dimensions (educational qualities, technical clarity and correctness of the presentation, quality of the answers to questions).
- Colleagues or other external experts will be invited where needed, to participate in specific sessions.

Initial competences

Considerable knowledge of Artificial Intelligence and Machine Learning methods, by having followed (or following) 'Artificial Intelligence' and 'Machine Learning' (or equivalent) and at least one more advanced course (such as 'Reinforcement Learning', 'Natural Language Processing', 'Deep Generative Models', 'Data Visualization for and with AI', 'Probabilistic Graphical Models', 'Speech Processing', or similar).

Final competences

1 Ability to critically read recent AI research papers, critically understand the main contributions and insights generated, present this understanding to an audience of peers, and engage in a dialogue with the audience in a Q&A session.
2 Ability to critically follow and interact during AI research presentations given by peers.
3 In-depth knowledge of some well-chosen recent research directions in AI.

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

Independent work

Extra information on the teaching methods

Guided self-study, flip-the-classroom, presentation, group discussion.

Study material

None

References

Course content-related study coaching

By the teachers and the assistants, before, during or after contact sessions, or by

appointment or via the e-learning system.

Assessment moments

continuous assessment

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

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

Examination methods in case of permanent assessment

Oral assessment, Presentation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

- Based on each student's own presentations:
  - The experts provide an assessment of each presentation with a mark (the experts can be one or both of the lecturers, or experts invited by them as and when the subject matter requires this).
- Based on each student's anonymous written feedback on other students' presentations:
  - After each seminar, students submit a short assessment (see above), which will be scored by the lecturers for insight and understanding.
  - As explained above, students are also asked to provide anonymous qualitative constructive feedback to the other students' presentations. The quality of this feedback will be assessed by the lecturers.

Calculation of the examination mark

Presentations (50%):

- 15%: clarity and style of the overview presentation.
- 20%: clarity, style, and scientific correctness of the in-depth presentation.
- 15%: clarity and scientific quality of the answers during the Q&A after the in-depth presentation.

Feedback and active participation (50%)

- 20%: evidence of understanding as demonstrated by written summaries of other in-depth presentations.
- 30%: active participation (in Q&A or debate sessions) and quality of the constructive feedback to the presentations from peers.