



COMPUTER SCIENCE AND ENGINEERING

DIT411 Introduction to Artificial Intelligence, 7.5 credits

Introduktion till artificiell intelligens, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2016-12-20 and was last revised on 2017-06-07 to be valid from 2017-08-20, autumn semester of 2017.

Field of education: Science 100%

Department: Computer Science and Engineering

Position in the educational system

The course is part of the Computer Science Master's Programme. The course is also a single subject course at the University of Gothenburg.

The course can be part of the following programmes: 1) Computer Science, Master's Programme (N2COS), 2) Applied Data Science Master's Programme (N2ADS), 3) Game Design & Technology Master's Programme (N2GDT) and 4) Computer Science, Bachelor's Programme (N1COS)

Main field of studies

Computer Science

Specialization

A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

To be eligible for the course students should have successfully completed courses corresponding to 90 hec within the subject Computer Science, or equivalent, including a second 7.5 hec programming course (DIT952 or DIT260 or equivalent) and a 7.5 hec course in data structures (DIT960 or equivalent).

Applicants must prove knowledge of English: English 6/English B or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- Explain basic concepts and algorithms for cost-based search, planning and constraint satisfaction problems (CSP).
- Compare advantages and disadvantages with different algorithms for search, planning and CSP.
- Account for the historical development, current situation and future prospects for some subarea of AI.

Competence and skills

- Choose appropriate algorithms for search, planning and CSP to solve given AI problems in a memory- and time-efficient manner.
- Implement efficient algorithms for search, planning and CSP in a suitable programming language.
- Summarise scientific progress and ethical issues.
- Write scientific texts.

Judgement and approach

- Analyse and critically discuss ethical issues within AI.
- Review and constructively criticise scientific texts.

Course content

Artificial Intelligence (AI) studies how computers can accomplish tasks that were traditionally thought to require human intelligence. This course gives an introduction to the subject and has two main purposes.

The first purpose is to give an understanding of which sub-areas there are within AI, their historical development and which ethical issues that can arise within different sub-areas. This is done by reading literature within different AI areas, by summarising and discussing the literature in writing, and by reviewing essays by other students.

Detta görs genom att läsa litteratur inom olika AI-områden, att sammanfatta och diskutera litteraturen skriftligt, och att granska uppsatser av andra studenter.

The second purpose is to teach basic concepts and algorithms for heuristic search, planning and problem solving, including their usage, and how they can be used to solve interesting AI problems. The following algorithms and concepts are included:

- general search problems – weighted and unweighted graphs, graph search, tree search, search trees

- different classes of search and planning problems – complete and incomplete information, deterministic and nondeterministic problems
- standard algorithms for deterministic search and planning with perfect information – uninformed search, informed search, local search
- search with incomplete information, nondeterministic problems, and problems with multiple agents
- constraint satisfaction problems (CSP)
- heuristics for informed search and for CSP

Sub-courses

1. **Written exam** (*Skriftlig tentamen*), 2.5 higher education credits
Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
2. **Project** (*Projekt*), 3.5 higher education credits
Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
3. **Essay** (*Uppsats*), 1.5 higher education credits
Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)

Form of teaching

The students form project groups of 3-5 persons, and every group is assigned a supervisor, a programming project and an essay topic. The forms of teaching are group supervision, essay writing, program development in groups, and peer review on essays by other groups. Furthermore there are theoretical lectures, practical assignments and written examination.

Language of instruction: English

Assessment

The course is examined by:

- an individual written examination (2.5 hec)
- a programming project carried out in groups of 3–5 students, with oral presentation (3.5 hec)
- a written essay in groups of 3–5 students, with peer review (1.5 hec)

To pass the group sub-courses, the student must participate actively during supervision, presentation and in the group's internal planning, and must make essential and measurable contributions to the final outcome (the program and the essay). To pass the essay sub-course, the student must furthermore read and actively discuss essays written by other project groups.

If the student is failed on a group sub-course, despite participating in the group work, they will get a task to complete individually instead of in a group. If the student also fails this, they have to redo the whole sub-course in a new project group.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

A Pass grade (G) for the entire course requires at least a Pass grade for all sub-courses.

A Pass with Distinction grade (VG) for the entire course requires a Pass with Distinction on two of the three sub-courses, in addition to at least a Pass grade for other sub-courses.

Course evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course is a joint course together with Chalmers.

Course literature to be announced the latest 8 weeks prior to the start of the course.

The course replaces the DIT410 Artificial Intelligence 7.5 hec course. The course cannot be included in a degree which contains DIT410. Neither can the course be included in a degree which is based on another degree in which the course DIT410 is included.