

Distributed Decision Making in Multiagent Systems, 3,5 credits

Distribuerad beslutsfattande i multiagentsystem, 3,5hp

Course Code/Codes	50DT053
Subject Area	Computer Science (datavetenskap)
School/equivalent	School of Science and Technology (Institutionen för naturvetenskap och teknik)
Valid from	2020-11-30
Approved	2017-12-15
Revised	2020-11-11
Approved by	Head of School (prefekt) Peter Johansson Institutionen för naturvetenskap och teknik
Translation to English, date and signature	

1 Course content

The course discusses new and established research for coordination and distributed decision making in multiagent systems. Based on formal grounding in game theory and mechanism design, different interaction situations that autonomous agents have to solve are discussed for both, cooperative and antagonistic settings: task allocation and coordination in cooperative systems; social choice (voting), auctions and markets, negotiation and coalition formation for egoistic agents.

2 Outcomes

2.1 The course in relation to the doctoral programme

The course shall primarily refer to the following intended learning outcomes for third-cycle courses and study programmes as described in the Higher Education Ordinance, i.e. the doctoral student shall demonstrate:

Knowledge and understanding

- broad knowledge and systematic understanding of the research field (part of outcome 1)
- advanced and up-to-date specialised knowledge in a limited area of this field (part of outcome 1)
- familiarity with the methods of the specific field of research in particular (part of outcome 2)

Competence and skills

- the capacity for scholarly analysis and synthesis (part of outcome 3)
- the capacity to review and assess new and complex phenomena, issues and situations autonomously and critically (part of outcome 3)
- the ability to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames (part of outcome 4)
- the ability to review and evaluate research and other qualified tasks (part of outcome 4)

Judgement and approach

- intellectual autonomy and disciplinary rectitude (part of outcome 9)

The intended learning outcomes are listed in the same order as in the general syllabus for the programme.

2.2 Intended course learning outcomes

To obtain a passing grade, the doctoral student shall demonstrate:

Knowledge and understanding

- the ability to explain and apply methods for coordination and decision making in multiagent groups and teams
- the competence to theoretically analyze solutions for simpler distributed decision making scenarios

Competence and skills

- the competence to develop and evaluate protocols and programs for solving complex problems in distributed decision making
- the ability to identify situations and problems in which approaches from distributed decision making can be formulated, and to sketch applicable solutions
- the competence to review scientific texts on advanced topics in Multiagent Systems

Judgement and approach

- the competence to discuss prerequisites and limits of applying particular mechanism as well as their consequences for successful application.

3 Reading list and other teaching material

The following course readings and teaching material will be used on the course:

Shoham Yoav.; Leighton-Brown Kevin (latest edition)
Multiagent systems, Algorithmic, Game-Theoretic and Logical Foundations.
Cambridge University Press

Weiss Gerhard ed. (latest edition)
Multiagent Systems
MIT Press

Specific chapter and additional readings will be assigned by the teacher depending on the actual needs of the students.

4 Teaching formats

Teaching on the course takes the following format:

- Video-based lectures about different topics in the area,
- Individual Assignments for deepening the knowledge provided in the videos.
- Three synchronous seminars. The first of these is introductory in nature. In the second seminar, the student will present an analysis of a particularly well suited, newly published work. In the third seminar, the student will present a conceptual solution to a multiagent system problem selected by the student.

5 Examination

The course is assessed through an examination consisting of the components listed below. The individual components are not graded separately but together they provide the basis for assessment and grading.

- Successful presentation in both seminars
Solution of all individual assignments

For examinations consisting of several examination components, the following applies: If during the course it is concluded that a doctoral student is unable to complete a certain examination component, the examiner may set a substitute assignment provided that circumstances do not reasonably allow for the course component to be completed at a later date during the run of the course.

6 Grades

Examinations on third-cycle courses and study programmes are to be assessed according to a two-grade scale with either of the grades 'fail' or 'pass' (local regulations).

The grade shall be determined by a teacher specifically nominated by the higher education institution (the examiner) (Higher Education Ordinance).

To obtain a passing grade on examinations included in the course, the doctoral student is required to demonstrate that he/she attains the intended course learning outcomes as described in section 2.2. Alternatively, if the course consists of multiple examinations generating credit, the doctoral student is required to demonstrate that he/she attains the outcomes that the examination in question refers to in accordance with section 5.

A student who has failed an examination is entitled to a retake.

If an examination consists of several examination components, and a student fails an examination component, the examiner may, as an alternative to a retake, set a make-up assignment with regard to the examination component in question.

A doctoral student who has failed an examination twice for a specific course or course element is entitled, upon his/her request, to have another examiner appointed to determine the grade.

7 Admission to the course

7.1 Admission requirements

To gain access to the course and complete the examinations included in the course, the applicant must be admitted to a doctoral programme at Örebro University.

7.2 Selection

Selection between applicants who have been admitted to doctoral programmes at Örebro University and who otherwise meet the admission requirements as listed above is made according to the following order of precedence:

If no other selection criteria are specified in this section, priority shall be given to applicants with a lower number of course credits left before the award of their degree over applicants with a higher number of remaining course credits. Should two or more students have equal number of credits, selection will be done through the drawing of lots. This also applies within any selection groups listed unless otherwise stated.

7.3 Other applicants than doctoral students admitted at Örebro University

Other applicants than doctoral students admitted at Örebro University may be given access to the course on the grounds of provisions for and/or agreements regarding contracted courses, joint degrees, national graduate schools or cooperation in other respects with other universities.

Any decisions on what such other applicants may be given access to the course are made separately and on the basis of the provisions and/or agreements that occasion the student to apply for the course.

For participation in the course in other respects, the same provisions shall apply as for doctoral students admitted to Örebro University.

8 Transfer of credits for courses, study programmes and other experience

Provisions on the transfer of credits can be found in the Higher Education Ordinance and on the university's webpage.

9 Other information

The course is taught in English.

Transitional provisions

None.