



COMPUTER SCIENCE AND ENGINEERING

DIT240 Distributed Systems, 7.5 credits

Distribuerade system, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by The IT Faculty Board on 2009-09-15 and was last revised on 2017-06-16 by Department of Computer Science and Engineering 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 a part of the Computer Science Master's Programme and 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) and 3) Computer Science, Bachelor's Programme (N1COS)

Main field of studies

Computer Science-Networks and Distributed Systems

Specialization

AXX, Second cycle, in-depth level of the course cannot be classified

Entry requirements

The requirement for the course is to have successfully completed courses corresponding to 120 hec within the subject Computer Science or equivalent.

Within the 120 hec the following courses are required;

- DIT663 Computer Networks, 7.5 hec or DIT420 Computer Communication, 7.5 hec (or equivalent)
- DIT400 Operating systems, 7.5 hec or DIT390 Concurrent programming, 7.5 hec (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

After completion of the course the student is expected to be able to:

1. Knowledge and understanding

- apply of basic concepts of distributed systems and their challenges, naming and synchronization of systems, consistency and replication, and fault tolerance in distributed systems.
- describe applications of distributed systems and the mechanisms these use to provide their services.
- discuss and analyse the challenges and requirements of different approaches.
- compare and summarize the strength and weaknesses associated with the individual mechanisms.

2. Skills and Abilities

- develop and evaluate small-scale distributed systems using fundamental mechanisms.
- demonstrate software developments in advanced settings including unreliable links and systems as well as limited bandwidth.
- demonstrate experimental results in oral and written presentation.

3. Judgement and approach

- describe and analyse existing and new methods for distributed systems design. In particular, the systems ability for scalability and fault tolerance.
- discuss and value the social and ethical aspects of distributed systems and their applications.

Course content

The course with an introduction to the basic concepts of distributed systems and the challenges they pose. After that, we revisit the required background in communication systems and operating systems. The main course content:

1. Naming

2. Mutual Exclusion and Election
3. Clocks and Time
4. Consistency and Replication
5. Fault Tolerance in Distributed Systems
6. Selected Applications in Distributed Systems

The lectures provide students with the required fundamentals, and labs give students a hands-on experience in developing distributed systems and exploring their real-world challenges.

This course involves hands-on experimentation and analysis as they reinforce student understanding of concepts and their application to real-world problems. Overall, this course provides the students the ability to understand fundamental issues in the design of methods for distributed systems.

Sub-courses

1. **Written exam** (*Tentamen*), 6 higher education credits
Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
2. **Laboratory work** (*Laboration*), 1.5 higher education credits
Grading scale: Pass (G) and Fail (U)

Form of teaching

Lectures, home assignments, laboratory work.

Language of instruction: English

Assessment

The course is examined on basis of a

- written exam done individually in an examination hall (6.0 hec)
- and the home assignment and Laboratory work, each done in a group of two, (total 1.5 hec) are presented both in written and oral form.

If a student, who has failed the same examined component twice, wishes to change examiner before the text 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).

In order to be awarded the grade Pass (G) for the entire course, the student must get the grade Pass on both the sub-courses.

In order to get the grade Pass with Distinction (VG) for the entire course, the student must get the grade Pass on the sub-course Written exam and get the grade Pass on the sub-course Laboratory work.

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.