Software Engineering

Objectives

Software affects us to an ever-increasing extent, both within industry and in our daily lives. Software Engineering deals with the design and development of high-quality software systems and is thus an increasingly important area of computer science. The one-year course block in Software Engineering gives you knowledge and practical skills in the development of software systems of high quality, which is invaluable for software architects, project managers and technical specialists. The demand for knowledgeable experts in software engineering is steadily increasing, which makes you very competitive nationally as well as internationally, both in industry and in academic research.

Knowledge and understanding

Within the framework of this course block the students will acquire knowledge, competence and experience in the development of software and software-intensive systems in a global perspective, and thereby develop the ability to understand, design and implement such systems in the global market.

The students are educated to be able to work with software development within different industrial sectors (e.g. home electronics, the automotive industry, telemedicine, telecommunications), information and service sectors (financial institutes, geographical information systems, transport services), consultancy, the public sector, the education sector and within academic research.

The students accumulate knowledge of the analysis, design and management of large and complex software systems. The students are also made aware of, and are trained to handle, cultural, social and financial differences; they know how to communicate in a global
network and a global work group, and can also interpret and make use of differences in their professional (and personal) lives. In the industrial area are included mentors and degree projects related to associated industries (e.g. ABB; Ericsson and Volvo).

**Skills and abilities**

On completion of the course block the student shall:

- analytically apply general principles of software development in the development of complex software and software-intensive systems,
- demonstrate the necessary understanding of methods and techniques for software management, and also to be able to use these in various development situations,
- master general principles and techniques for dealing with quality attributes for various types of software systems (e.g. security and reliability)
- understand, plan and carry out independent work within various application domains,
- transcend cultural, social and financial differences and work in international teams, proactively plan and manage one’s future career, as well as personal development,
- reflect oneself and critically evaluate one’s own ability to deal with complex problems,
- search for, read, understand and evaluate research articles and thus be aware of the research front in software development.

**Critical judgment and approach**

On completion of the block in software engineering the student shall:

- demonstrate the ability, in Computer Science, to make assessments with regard to relevant scientific, societal and ethical aspects, and also demonstrate awareness of ethical aspects of research and development work,
- demonstrate insight into the possibilities and limitations of science, its role in society and the responsibility of human beings for how this is used, and also demonstrate the ability to identify his/her need of further knowledge and be able to take responsibility for his/her own knowledge development.
Language

The language of instruction is English, which includes all teaching, examination and literature, etc.

Special Eligibility Requirements

A completed Bachelor’s degree (or equivalent) from an institution of higher education of 3 years or more, equivalent to 180 credits, of which at least 90 credits are within Computer Science or Computer Engineering and at least 22.5 credits in Mathematics/Applied Mathematics. English B is required for Swedish students. International students are required to submit a TOEFL test result, with a minimum score of 575 with a score of at least 4.5 (PBT) or 90 with a TWE score of at least 20 (iBT) or an IELTS test result with an overall band score of at least 6.5 and no band score below 5.5 or equivalent.

Selection

Selection is based on the number of academic credits.

Contents

The block consists of 60 credits of courses as given in the table below:

<table>
<thead>
<tr>
<th>Semester 1 (Fall)</th>
<th>Semester 2 (Spring)</th>
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<tbody>
<tr>
<td>DVA313 – Software Engineering I, 7.5 ECTS credits</td>
<td>CDT413 – Advanced Software engineering, 7.5</td>
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<tr>
<td>DVA313 – Software Engineering II – Project teamwork, 7.5</td>
<td>CDT501 – Advanced Component-based software engineering, 7.5</td>
</tr>
<tr>
<td>CDT414 – Software Verification and Validation, 7.5</td>
<td>CDT411 – Model-Driven Software Engineering, 7.5</td>
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The details about the courses can be found in their syllabuses at:

http://www.mdh.se/studieinformation/kursplaner.jsp
Choices within the block
The student will be given a possibility to choose between several different projects within the project courses.

Host School
School of Innovation, Design and Engineering

Quality Assurance
The program is continuously evaluated by the steering committee that consists of the representatives from the academia, students, and industrial partners. The School of Innovation, Design and Engineering (IDT) is responsible for the planning of the program, for the dissemination of information about the program, for guiding its students, and for an on-going evaluation of the program. Evaluation of courses plays an important part in periodic revisions of the program.

Research Base
The University's research is conducted primarily within six prioritised specialisations singled out in the University’s Education and Research Strategy. The degree programme is linked to the prioritised specialisation of Embedded Systems. The Department of Software Engineering, which is responsible for the programme, has several internationally successful researchers in software engineering who actively participate at the biggest conferences within the field. The main research areas within the Department comprise Component-based Software Engineering, Software Processes, and Testing and Development of Reliable Software. All research is carried out in projects with specific goals in respect of publications, joint projects and prototype tools, and we endeavour to allow our research findings to be used in our teaching to as large an extent as possible. The majority of the courses at second-cycle level during the second year present current research, and are given both for programme students and doctoral students at the Department. This prepares our students for a successful career, both in industry and within the School.

Industrial Cooperation
The University’s work at first-, second- and third-cycle levels is done in cooperation and coproduction with industry, organisations and the public sector both locally, regionally, nationally and internationally. We guarantee quality and industrial relevance within our courses and study programmes with the aid of our industrial partners, who
contribute with equipment, guest lectures, and, if possible, by offering employment to our students.

**Equality and equal opportunities**

Mälardalen University has established bodies and procedures that deal with equal opportunities, gender balance, and social equity. We have norms and routines for ensuring fair selection and provide specific support for different groups related to equality or additional support for the needed groups. Computer engineering is an area in which traditionally female students are less participating than male students. For this reason we will increase efforts to attract more female students.

Furthermore, MDH is equipped to accommodate students with various disabilities. Disabled students have their own service, which can help in arranging any extra equipment necessary to make their stay as convenient as possible. For example, there is special equipment for students with reduced sight and hearing. The universities has also specialized support for students with dyslexia and are equipped to accommodate students with various other disabilities. A common factor of most of our buildings is that they are either new or have been painstakingly renovated to provide support for disabled students.