



IT FACULTY

Software Engineering and Management Bachelor's Programme, 180 credits

Software Engineering and Management kandidatprogram, 180 högskolepoäng

Programme code: N1SOF

First cycle / Grundnivå

1. Confirmation

This programme syllabus was confirmed by the IT Faculty Board on 05-10-2020 (GU 2020/2333) and was last revised on 16-06-2023 (GU 2023/1727) to be valid from 02-09-2024, Autumn semester 2024.

Responsible Department/Equivalent: Department of Computer Science and Engineering

2. Purpose

By designing smart and efficient IT-solutions we can influence the future of peoples' lives. People who – with the help of technology and management – create innovative products are sought after around the world.

The aim of the programme in Software Engineering and Management is to provide students with theoretical knowledge and practical skills required in a knowledge-intensive and changing IT industry. The Software Engineering and Management programme is about methods and techniques for developing computer applications, asking the right questions to the customer, translating customer answers into design and managing projects, organizations and development teams. The programme will help students to develop good technical skills, the capability to analyze a problem, the ability to estimate time and cost for a larger development project and the capacity to communicate and interact with customers and other partners in a big software development project.

Students will be confronted with engineering and management problems from all areas of software engineering: 'how do large organizations specify software?', 'how can they ensure sound architectures?', 'what language tools and platforms are available to realize software?', 'how is quality obtained and managed?', 'what are the challenges of decade long software lifetimes?', and 'how to act in an industrial development context?'

The programme is international and open to students from around the world. The programme offers the students a technical and social environment in which they apply and develop both

theoretical knowledge and practical skills. The programme has tight relationship to the IT industry and the students are introduced to realistic problems experienced in the IT industry. Within the courses and projects we collaborate with practitioners from industry and the students are introduced to guest lecturers, supervisors and workshops from industry. The close relationship to industry is an important profile of the programme. Our students are offered an academic environment in which theoretical knowledge is important – and at the same time an environment in which they grow as professional practitioners.

After completing the programme the student is suited for working in the IT industry in professions as for example system developers, programmers or testers.

3. Entry requirements

General entrance requirements for university studies and the Swedish upper secondary courses English 6, Mathematics 3b/3c or equivalent.

Specific entry requirements for admission to a course within the study programme

Within the study programme there can be specific entry requirements for admission to individual courses. These specific entry requirements are documented in each course syllabus and state which entry requirements are necessary to be registered on a course within the study programme.

Selection

Selection is according to the Higher Education Ordinance and the University of Gothenburg admission regulations for education on first and second cycle.

4. Higher education qualification and main field of study

This programme leads to a Degree of Bachelor of Science with a major in Software Engineering (Filosofie kandidatexamen med huvudområdet Software Engineering).

5. Outcomes

General outcomes for Degree of Bachelor

Knowledge and understanding

For a Degree of Bachelor the student shall

- demonstrate knowledge and understanding in the main field of study, including knowledge of the disciplinary foundation of the field, knowledge of applicable methodologies in the field, specialised study in some aspect of the field as well as awareness of current research issues.

Competence and skills

For a Degree of Bachelor the student shall

- demonstrate the ability to search for, gather, evaluate and critically interpret the relevant information for a formulated problem and also discuss phenomena, issues and situations critically
- demonstrate the ability to identify, formulate and solve problems autonomously and to complete tasks within predetermined time frames
- demonstrate the ability to present and discuss information, problems and solutions in speech and writing and in dialogue with different audiences, and
- demonstrate the skills required to work autonomously in the main field of study.

Judgement and approach

For a Degree of Bachelor the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues
- demonstrate insight into the role of knowledge in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the need for further knowledge and ongoing learning.

Local outcomes

Knowledge and understanding

For a Degree of Bachelor of Science with a major in Software Engineering the student shall

- explain the basic concepts of programming languages,
- understand the various factors affecting the success of a software development project,
- know about project and time management techniques, which may be used to achieve software engineering objectives,
- know about effective methods, techniques, and tools to design and implement software projects,
- explain the role of team work in software development,
- describe the various phases of software development life cycles,
- explain, analyze, and discuss how central concepts/models within leadership theory can be applied in software development teams/organizations, and
- understand the importance and role of ethics in software engineering.

Competence and skills

For a Degree of Bachelor of Science with a major in Software Engineering the student shall

- apply problem-solving and analytical skills to software development,
- express and assess computer programs algorithmically,
- work effectively in different phases of software development life cycle,
- be able to analyze requirements of computing problems and design solutions,
- construct, test and document software systems,
- be effective member of a software development team,
- use appropriate programming languages and diagramming techniques to develop high quality software systems using a variety of software tools and technologies,

- establish and apply metrics to determine the readiness, quality, and operability of software, systems and products,
- develop high quality products and solutions in various domains such as embedded systems, web, and distributed systems,
- work effectively on open-ended software development problems using suitable theories and methods, and
- identify, investigate and critically assess published work in software engineering.

Judgement and approach

For a Degree of Bachelor of Science with a major in Software Engineering the student shall

- demonstrate theoretical and practical knowledge of designing, developing and assessing software systems against their design requirements, and
- demonstrate knowledge and understanding of programming fundamentals, software development methods and tools, development environments, and human factors of software development.

6. Content and structure

The programme consists of courses in Software Engineering and Software Management. The programme includes a total of 180 credits. Of these are 150 credits compulsory courses within the main field of study Software Engineering, including 15 credits independent project (degree project). Furthermore, the programme includes a maximum of 30 credits of optional courses.

A key element of the curriculum is the focus on problem-based and project-based learning. Students work on broad and complex problem definitions and they learn to structure and solve bigger problems by dividing them into smaller tasks. All students are trained in taking responsibility for their learning and the teachers, supervisors and the educational environment are all resources in this process. Each term students break out into groups to work on a project that develops or applies IT to a significant social or organizational problem. This approach allows students to work on large projects that provide them with the opportunity to create a realistic, team-oriented work environment in which they learn different roles such as, for example, project manager, software architect, quality manager and system developer. An important skill that our students are trained in is the ability to work in groups and to find their role in a project group.

The education is given in English at full time and is conducted in the form of lectures, seminars, teacher-led exercises, and supervision in connection to the exercises as well as projects in which students apply and deepen their knowledge. All literature and communication is in English.

The curriculum is taught over six academic terms spanning three years. Each academic year includes two terms. The extent of each term is 30 credits. Each term is divided into two study periods, each of 15 credits. In most study periods, students attend two courses in parallel. Each of the six terms has a specific theme that influences both the courses and the term project.

Study process

The first two years of the programme consist of compulsory courses in Software Engineering.

During the third year the student can choose optional courses within or outside the main field of study.

Progression in the programme is based on the results in previous courses and projects. To graduate from the programme in the main field of study students must successfully complete all compulsory programme courses.

The following compulsory courses are included in the programme:

- Discrete Mathematics, 7.5 credits
- Fundamentals of Programming, 7.5 credits
- Object-Oriented Programming, 7.5 credits
- Project: Agile Software Project Management, 7.5 credits
- Data Management, 7.5 credits
- Requirements Engineering, 7.5 credits
- Data Structures and Algorithms, 7.5 credits
- Project: Systems Development, 7.5 credits
- Fundamentals of Software Architecture, 7.5 credits
- Distributed Systems, 7.5 credits
- Human-Computer Interaction, 7.5 credits
- Project: Web Engineering, 7.5 credits
- Development of Embedded and Real Time Systems, 7.5 credits
- Software Quality and Testing, 7.5 credits
- Project: Data-Driven Software Engineering for Cyber Physical Systems, 7.5 credits
- Advanced Programming, 7.5 credits
- Management and Leadership, 7.5 credits
- Research Methods in Software Engineering, 7.5 credits
- Bachelor Thesis in Software Engineering and Management, 15 credits

Optional courses

Within the programme, students can study optional courses within or outside the main field of study to an extent of 30 credits. The curriculum includes the following optional courses within the main field of study Software Engineering:

- Software Innovation, 15 credits
- Change Management in Software Development Organizations, 7.5 credits
- AI Engineering, 7.5 credits
- Software Engineering for Data-Intensive AI Applications, 15 credits

7. Guaranteed admission

Students who follow the study programme at the prescribed pace have guaranteed admission to compulsory and optional courses provided that specific entry requirements are fulfilled and the student applies to the course within the study programme within the prescribed application period.

Admission to the course Project: Software Innovation depends on the availability of project

topics and the availability of a supervisor from the faculty.

For optional courses outside the study programme local admission regulations are valid and there is no guaranteed admission.

8. Other information

Credit transfer of former education

In some cases, the student has the right to be given credit for former higher education according to the legislative regulations of the Higher Education Ordinance.

Evaluation

The study programme will be followed up and evaluated in accordance with the applicable Policy för kvalitetssäkring och kvalitetsutveckling av utbildning vid Göteborgs universitet (Policy for the Quality assurance and Quality Development of Education at the University of Gothenburg).

Revision of the syllabus

This syllabus is a revision of the syllabus confirmed by the IT Faculty Board on 17-06-2016 (reg. no. G 2016/178).