



## Programme syllabus

Organisational Committee

Faculty of Technology

Programvaruteknik, 180 högskolepoäng

Software Technology Programme, 180 credits

### **Level**

First Level

### **Date of Ratification**

Approved by Faculty of Technology 2009-12-15

Revised 2023-09-08

The programme syllabus is valid from autumn semester 2024

### **Prerequisites**

General entry requirements + Mathematics 3c.

## Description of Programme

The degree programme will provide students with a good knowledge of the computer science field with a focus on software technology. Studies will prepare for work in organisations where software is used and developed. In addition, it will prepare students for further studies at second (advanced) level in computer science.

Today, computers used in all sectors of society. There is therefore a need for trained professionals to develop the software that controls current and future systems. Both large and small companies / organisations will have a need for software developers and operators of their systems.

## Objectives

### *Knowledge and understanding*

For a Degree of Bachelor students must

- demonstrate knowledge and understanding in their main field of study, including knowledge of the scientific basis of the field, knowledge of applicable methods in the field, in-depth knowledge of some part of the field and a general sense of current research issues.

### *Skills and abilities*

For a Degree of Bachelor students must

- demonstrate an ability to seek, gather and critically interpret information that is

- relevant to a problem and to critically discuss phenomena, issues and situations;
- demonstrate an ability to independently identify, formulate and solve problems and to perform tasks within specified time limits;
- demonstrate an ability to present and discuss information, problems and solutions in dialogue with different groups, orally and in writing; and
- demonstrate the skills required to work independently in the field that the education concerns.

#### *Judgement and approach*

For a Degree of Bachelor students must

- demonstrate an ability to make assessments in their main field of study, taking into account relevant scientific, social and ethical aspects;
- demonstrate insight into the role of knowledge in society and into people's responsibility for how knowledge is used; and
- demonstrate an ability to identify their need of further knowledge and to upgrade their capabilities.

#### **Programme-specific objectives**

##### *Skills and abilities*

Upon completion of the degree programme, the student will be able to:

- specify, design, implement, evaluate and document software systems.

## Content

### *Programme Overview*

The study programme comprises 180 credits and includes a final degree dissertation project of 15 credits.

The programme consists primarily of courses in Computer Science. These are divided into general introductory courses, advanced courses in key areas and courses in the study programme's specialization, software technology.

In addition to courses in computer science there are also courses in other subjects, mainly Mathematics. These courses aim to prepare students for in-depth courses in Computer Science and to provide students with a solid background as a basis for their future professional role.

The study programme's objectives are fulfilled in varying degrees by individual courses given within the study programme. Knowledge of software engineering is for instance given in a variety of courses, while skills in security are provided in network security courses. For all objectives, there are several different courses meeting these objectives.

The programme is offered in two versions, one entirely in English and one where you mix courses taught in English and in Swedish. The mixed version requires eligibility in Swedish.

### *Programme Courses*

The exact placement of courses in year and study period may vary slightly from year to year. The courses in the program can also be exchanged for other courses within the program's direction, in agreement with the program manager. In exchange for courses, the program manager checks that the program's goals and requirements are still met.

The prerequisites for courses as well as the local rules for the Linnaeus University degree must always be met.

The programme courses are divided into levels G1N, G1F, G2E, and G2F. Courses on G2 level usually have courses on level G1 as a prerequisite.

- G1N undergraduate level, has only secondary school prerequisites
- G1F undergraduate level, have less than 60 credits in course prerequisites
- G2F undergraduate level, have at least 60 credits in course prerequisites
- G2E undergraduate level, have at least 60 credits in course prerequisites

### Year 1

- **Introduction to Programming (G1N)**, 7.5 credits \* – An introductory programming course focusing on programming skills and common programming language constructs and data structures.
- **Basic Mathematics for Computer Scientists (G1N)**, 7.5 credits - Introductory in mathematics which deals with numbers, algebraic expressions, equations, functions, trigonometry, exponential functions, logarithm, prime numbers, divisors, combinatorics and complex numbers.
- **Computer Security (G1F)**, 7.5 credits \* - Introduction in IT Security. Concepts like risks, threats and security services are introduced and exemplified. Focus is on security for a stand-alone computer system.
- **Programming and Data Structures (G1F)**, 7.5 credits \* - Continuation of programming with focus on data structures and algorithms.
- **Database Technology (G1F)**, 7.5 credits \* - A course that covers modelling of data, storing and retrieving data from databases. SQL and relation databases are in focus but other types of data bases is also introduced. The course also cover how programs can connect to databases.
- **Object-oriented Programming (G1F)**, 7.5 credits \* - Program development based on object-oriented concepts, such as classes, inheritance and polymorphism. The concepts are concretized with the help of some common design patterns. The course requires that students have knowledge of basic programming.
- **Project course in Computer Science (G1F)**, 7.5 credits \* - Continuation course improving both programming and team working skill. Provides an introduction to the software development process and related tools.
- **Discrete Mathematics (G1F)**, 7.5 credits - The course will introduce basic concepts and methods of discrete mathematics, with areas like number theory, induction, relations, combinatorial and graph theory.

### Year 2

- **Object Oriented Analysis and Design using UML (G1F)**, 7.5 credits \* - Object oriented analysis and design focusing on frequently occurring design problems and practical examples.
- **Computer Technology 1 (G1F)**, 7.5 credits - Computer Technology aims at giving an understanding on the connection between hardware and software. Computer organization and low-level programming are important modules.
- **Operating Systems (G1F)**, 7.5 credits \* - Provides an overview of the structure of operating systems and the resources that it manages.
- **Elective course**, 7.5 credits - Recommended course is **Linear Algebra (G1F)**.
- **Computer Networks - an introduction (G1F)**, 7.5 credits \* - Provides

theoretical knowledge about computer communication and computer networks, and practical skills in network programming.

- **Software Design** (G2F), 7,5 credits \* - The course motivates the need for quality and elaborates on Software Engineering practices for achieving it, namely Requirement Engineering, Performance Engineering, and Software Architecting and Design.
- **Project Course in Software Engineering** (G2F), 7,5 credits \* - The aim of this course is to introduce the students to advanced concepts in software design. The course is project-oriented.
- **Elective course**, 7.5 credits - Recommended course is **Introduction to Machine Learning** (G2F) \*.

### Year 3

- **Software Testing** (G1F), 7.5 credits \* - The purpose of this course is to give the student basic knowledge about different types of testing of software systems like unit testing, integration testing, system testing, regression testing and acceptance testing.
- **Algorithms and Advanced Data Structures** (G1F), 7.5 credits \* - The purpose of this course is to give knowledge about how use data structures and algorithms and the effect they will have on time complexity.
- **Elective course**, 7.5 credits
- **Web Development** (G2F), 7,5 credits \* - Construction of web applications (full stack) with focus on the web as a development platform consisting of containers, servers, frameworks and more and how these parts communicate with each other.
- **Software Architectures** (G2F), 7.5 credits \* - Understand, analyse and develop complex systems on the Software Architecture level.
- **Scientific Methods** (G2F), 7,5 credits \* - Introductory course in scientific methods which deals with scientific theory and its history, as well as various scientific methods, e.g. systematic text studies and hypothesis testing. The course covers elementary statistics and probability theory. The methods are exemplified and deepened with software engineering questions.
- **Degree Project at Bachelor Level** (G2E), 15 credits \*

\* Courses in the main subject area of Computer Science

All courses except elective courses are obligatory.

Detailed descriptions of the courses are given in separate course syllabuses.

When choosing elective courses, it is important to make sure the student select at least one course that is not in the main subject area Computer Science to make sure the requirement of having at least 30 credits outside the main subject area.

#### *Societal relevance*

The Department of Computer Science has contacts with a large number of companies in the region. About 200 of these companies are part of the DIGITRI network initiated by Computer Science. DIGITRI has a large number of activities annually, on which the students of the program are offered to participate. During the programme, students will meet representatives from working life at regular intervals. Several courses involve the participation of guest speakers in teaching. In a couple of courses projects are carried out together with companies or other organizations. Degree project work can be conducted in cooperation with a company.

### *Internationalization*

Swedish and international students meet in most of the courses in the programme. Part of the teaching staff also has an international background. This gives many opportunities for internationalisation at home. During the third year of the programme, studies abroad can be arranged over one or two terms within the framework for the degree programme. Course selection is carried out in consultation with the programme director to ensure future validation within the degree programme.

### *Scope of Programme*

Computer science, the main subject in this study programme, is largely about developing and adapting new technologies for use by persons. The target audience for this is increasingly international. Ethical and legal questions around IT security are present in many of the programme's courses. Concepts like usefulness, user experience, target group adaptation, availability, etc. are common in many courses. Thus, the concepts of sustainable development, gender and equal opportunities, diversity and internationalization constitute natural parts of the degree programme.

## Quality Development

Course evaluations are carried out for all courses in the programme. Every year there is also an annual programme evaluation. It is predominantly the programme council that monitors quality assurance and ongoing development of programme. Students are represented in all these bodies and participate in course and programme evaluations. Both the programme and course evaluations are filed and are available for inspection at the University.

## Degree Certificate

After completing programme studies, corresponding to the requirements expressed in the Higher Education Ordinance Degree Ordinance as well as Linnaeus University Local Degree Ordinance, the student may apply for a degree.

Those who have completed the Software Technology Programme may obtain the following degree:

Filosofie kandidatexamen med inriktning mot programvaruteknik (Huvudområde: Datavetenskap)

Degree of Bachelor of Science with specialisation in Software Technology. Main field of study: Computer Science.

The degree certificate is bilingual (in Swedish/English). The Degree Certificate is accompanied by a Diploma Supplement (in English).

## Other Information

Prerequisites exist for progression within the program. What the prerequisites are are specified in the respective syllabus.

The program's studies require own access to a laptop computer.

The program includes travel in connection with company visits. This may possibly entail some extra costs for the students.

Some of the courses may be given in English.

Some of the courses will be taken together with students from Campus Kalmar. In those cases, the lesson is recorded and made available via the Internet. In many cases, the lesson is streamed "live" and students are given the opportunity to interact with the teacher via a chat.