PROGRAMME STUDY PLAN

Computer Science Engineering

Programme Code
TGDDI

Programme Title
Study Programme in Engineering: Computer Science

Programme Approval
The Programme Study Plan was approved by the Faculty Board of Health, Science and Technology on 12 March 2015 and is valid from the autumn semester of 2015 at Karlstad University.

Programme Title
Study Programme in Engineering: Computer Science

ECTS Credits
180

Language of Instruction
Swedish

Degree Level
Bachelor

Degree Type
Professional and/or General degree

Prerequisites
General admission requirements plus upper secondary school level Physics 2 and Mathematics 3c (field-specific eligibility A8 with the exception of Chemistry 1), alternatively field-specific eligibility 8 with the exception of Chemistry A. Mathematics D and Physics B

General Information
This engineering programme is designed to provide qualifications for working in the field of computer science with a focus on computer security or Internet technology or programme development.
Aims
Theory and application continuously alternate in a way that promotes learning and reflection. The theory components provide knowledge and understanding while practical exercises develop skills and abilities. The students' attitudes and judgement ability develop and increase as a natural part of the educational progression.

Knowledge and understanding
For a Degree of Bachelor of Science, students shall:
- demonstrate knowledge of the disciplinary foundation of computer science and its proven experience as well as awareness of current research and development work, and
- demonstrate broad knowledge of computer science and relevant knowledge of mathematics and natural science

Competence and skills
For a Degree of Bachelor of Science, students shall:
- demonstrate the ability to identify, formulate and deal with computer science issues independently and creatively using a holistic approach and to analyse and evaluate technological solutions
- demonstrate ability to plan and carry out tasks in computer science within specified parameters, using appropriate methods,
- demonstrate ability to use knowledge critically and systematically and to model, implement, predict and evaluate computer science artefacts and processes based on relevant information,
- demonstrate ability to design and manage products, processes and systems taking into account people’s situations and needs as well as society’s objectives for economically, socially and ecologically sustainable development,
- demonstrate the capacity for teamwork and collaboration with various constellations, and
- demonstrate the ability to present and discuss information, problems and solutions in speech and writing and in dialogue with different audiences.

Judgement and Approach
For a Degree of Bachelor of Science, students shall:
- demonstrate ability to make assessments based on relevant disciplinary, social and ethical aspects,
- demonstrate insight into the potential and limitations of technology, its role in society and responsibility for its use, including social and economic aspects as well as environmental and work environment aspects, and
- demonstrate ability to identify their need of further knowledge and to continuously upgrade their skills.

Independent project (degree project)
A requirement for the award of a Degree of Bachelor of Science in Engineering is completion by the student of an independent project (degree project) for at least 15 credits.

Programme Structure
In the first two years of the programme, students study basic courses in primarily computer science, but also mathematics and electrical engineering.

In the third year, students take specialisation courses in computer safety, Internet technology, programme development or other areas of computer science. In addition, there is one semester of optional courses. Students are free to study further courses in computer science to enhance their major field or courses in other disciplines to create a unique degree profile. There are also opportunities to study abroad. Karlstad University had exchange agreements with universities in many countries. The International Office at the university can give more information.
A degree project, which is usually carried out in conjunction with a company, public agency, or one of the computer science research groups, concludes the study programme.

**Programme Curriculum**

**Core courses**
Mandatory programme courses in the first two years:

**Computer science, 67.5 ECTS cr.**
- Programming Techniques, 7.5 ECTS cr
- Software development methodology, 7.5 ECTS cr
- Computer engineering, 7.5 ECTS cr
- Operating systems, 7.5 ECTS cr
- Data structures and algorithms, 7.5 ECTS cr
- Computer networking I, 7.5 ECTS cr
- Database Techniques, 7.5 ECTS cr
- Green Computing, 7.5 ECTS cr
- Programming language, 7.5 ECTS cr

**Mathematics, 30 ECTS cr:**
- Mathematics for engineers I, 7.5 ECTS cr
- Mathematics for engineers II, 7.5 ECTS cr
- Mathematics for computer scientists, 7.5 ECTS cr
- Mathematical statistics, 7.5 ECTS cr

**Electrical engineering 15 ECTS cr**
- Circuits analysis, 7.5 ECTS cr
- Digital electronics, 7.5 ECTS cr

**Other technological area, 7.5 ECTS cr**
- Mechanics, 7.5 ECTS cr

**Specialisation courses**

The following specialisation areas and optional courses are recommended for the third year:

**Internet technology**
- Computer networking II, 7.5 ECTS cr
- Distributed systems and applications, 7.5 ECTS cr

**Computer safety**
- Computer security I, 7.5 ECTS cr
- Computer security II, 7.5 ECTS cr

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1 The courses can, after consultation with the programme coordinator, be replaced by other courses in mathematics relevant to the programme.
2 The courses can, after consultation with the programme coordinator, be replaced by other courses in electrical engineering relevant to the programme.
3 The courses can, after consultation with the programme coordinator, be replaced by other courses in technology relevant to the programme.
Programm development
- Software engineering, 7.5 ECTS cr
- Project work in computer science, 7.5 ECTS cr

Other areas
- Courses at G2F level in computer science

Optional courses, 30 ECTS cr
Recommended courses:
- Project work in computer science, 7.5 ECTS cr and Software engineering, 7.5 ECTS cr since these courses prepare students for the most common work procedures in professional life.

Degree project, 15 ECTS cr
- Computer science – Degree project/Bachelor Thesis, 15 ECTS cr.

Degree Title
Degree of Bachelor of Science in Engineering
Computer Science Engineering

Credit Transfer
Students may transfer credits from previously completed university courses. subject to approval as specified in current regulations

Additional Information
The local regulations for undergraduate studies at Karlstad University stipulate the obligations and rights of students and staff.