Linnæus University

Jnr: HL/2009-0168

Programme syllabus

Faculty Board of Science and Engineering
School of Computer Science, Physics and Mathematics

Datateknik, högskoleingenjör, 180 högskolepoäng
Computer Engineering Programme, 180 credits

Level
First Level

Establishment of Programme
Established by Organisational Committee 2009-03-26

Date of Ratification
Approved by Organisational Committee 2009-09-15
The programme syllabus is valid from autumn semester 2010

Prerequisites
General entry requirements and Mathematics D, Physics B or Mathematics 3c, Physics 2 (Field-specific entry requirements 8/A8). Basic eligibility and Physics B, Mathematics D

Description of Programme

The program aims to prepare students for a profession as engineers in computer science. The program will also provide opportunities for further education at advanced level, ie master's courses. The program therefore combines basic theoretical courses with more practical applied courses in programming and other topics. Courses which provide basic skills include: mathematics, physics, electricity, electronics, telecommunications and data communications. More practically applicable courses are for an instance operating systems, databases, object-oriented programming, computer technology, electronic design, etc. A newly graduated Bachelor has thus knowledge that enables him or her to quickly get into the professional role, but also knowledge which enables further education throughout their careers. Also included are two courses in the area Technology, Man, and Society, these courses are in the field of economics, organization, leadership, environmental technology and/or quality engineering.

Objectives

Knowledge and understanding
For a Bachelor of Science in Engineering the student shall have:

- demonstrated knowledge of the disciplinary foundation of the engineering field chosen and best practice in this field as well as awareness of current research and development work, and
- demonstrated broad knowledge in the engineering field chosen and relevant knowledge of mathematics and the natural sciences.

Skills and abilities

For a Bachelor of Science in Engineering the student shall have:

- demonstrated the ability to identify, formulate and deal with issues autonomously and creatively and to analyse and evaluate technological solutions
- demonstrated the ability to plan and using appropriate methods undertake tasks within predetermined parameters
- demonstrated the ability to use knowledge critically and systematically to model, simulate, predict and evaluate series of events on the basis of relevant information
- demonstrated the ability to design and manage products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community
- demonstrated the capacity for teamwork and collaboration with various constellations, and
- demonstrated 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 Bachelor of Science in Engineering the student shall have:

- demonstrated the ability to make assessments informed by relevant disciplinary, social and ethical aspects
- demonstrated insight into the possibilities and limitations of technology, its role in society and the responsibility of the individual for how it is used, including social and economic aspects as well as environmental and occupational health and safety aspects
- demonstrated the ability to identify the need for further knowledge and undertake ongoing development of his or her skills.

Programme-specific objectives
Knowledge and understanding
After the training, students will have the following knowledge and understanding:

- general knowledge of computers and computer systems
- knowledge of various programming languages, operating systems, databases, etc.
- some knowledge and understanding of the hardware design of computer systems, especially computers for embedded systems
- some knowledge of telecommunications and data communications
- general theoretical skills required to assimilate knowledge in Computer Technology.

Skills and abilities
After the training, students will have the following skills and abilities:

- good knowledge in programming in different programming languages
- knowledge of project-oriented development
- creativity and initiative.

Judgement and approach
After the training, students will have the following approach and ability to evaluate:

- demonstrate an ability to evaluate as an engineer, i.e. assessing the relevance, accuracy and applications in analysis and calculations given appropriate assumptions and simplifications
- demonstrate the ability to identify the need for greater knowledge in connection to the computer technology / computer science field.

Content

Organization

The program has a program coordinator in charge of the program, he/she has a responsibility to ensure that the programme syllabus is followed. The students can contact the program coordinator for questions relating to education.
Most of the teaching in the program is conducted by the School of Computer Science, Physics and Mathematics (DFM), a minor part of the Department of Engineering.

Program Overview

The program comprises 180 credits and leads to a Bachelor of Science. The program includes three grades: Each grade is divided into two semesters. Each semester consists of two study periods. Each study period normally includes two courses of 7.5 credits each.
The first year includes primarily basic courses in computer science, electronics and mathematics. These courses are required as a base for courses in Years 2 and 3.
The second year includes courses that build on the knowledge from Year 1 and provides deeper understanding of the subject. Some courses are more applied. The second year also includes the courses in TMS, Technology, Man and Society.

Most of the courses during the third year are elective. This means that the student himself can determine the focus of their training.
The elective courses belong to the subject areas computer science, computer engineering and electrical engineering. Theoretic courses and more applied courses are available to choose from.
The third year includes a degree project. The degree project is done either individually or in groups of two students. The degree project is usually done at a company, where the problem to be solved is a real problem. The degree project is also a training in planning and implementing a project, the ability to define problems, conduct a study, analyze and present findings orally and in writing.
The degree project can also sometimes mean that the student makes an in-depth study of a particular limited field of technology. The result of this work is compiled in a written report, which also will be presented orally to the teachers and students.

Courses in the program

The exact location of courses in grades and study period can vary from year to years. Individual courses can also be replaced by others without change in the curriculum. The various input rates are divided into levels G1N, G1F, G1E, G2E, and G2F.
Courses on G2 level usually have courses on level G1 as entry requirements.
G1N elementary, has only secondary entry requirements
G1F undergraduate level, have less than 60 credits in course / s as entry requirements
G1E elementary, containing specially crafted thesis for university degree
G2F undergraduate level, have at least 60 credits in course / s as entry requirements
G2E undergraduate level, have at least 60 credits in course / s as entry requirements
The final thesis is on level G2E and is normally done during the spring semester the third year.

Courses included:

Year 1:
- Mathematics: algebra, analysis, a total of 15 credits, G1N/G1F
- Computer Science, 15 credits, G1N/G1F
- Digital Technology, 7.5 credits, G1N
- Physics: Electricity, 7.5 credits, G1N
- Electronics, 7,5 credits, G1F
- Project, 7.5 credits, G1N

Year 2:

- Mathematics, vector geometry, 7.5 credits, G1F
- Computer 1, 7.5 credits, G1F
- Telecommunication, 7.5 credits, G1F
- Signals and Systems, 7.5 credits, G1F
- Data Communication, 7.5 credits, G1F
- Computer 2, 7.5 credits, G1F

Courses within TMS (Technology, Man, Society), of which at least two shall be chosen: (total 15 credits)
- Industrial Management, 7.5 credits, G1F
- Environmental Technology, 7.5 credits, G1F
- Quality Technology, 7.5 credits, G1F
- Industrial Organization, 7.5 credits, G1F

Year 3:
- Operating Systems, 7.5 credits, G1F

Elective courses in electrical and computer technology:
- Signal Processors, 7.5 credits, G2F
- Programmable controllers PLC, 7.5 credits, G1F
- Electronic design, CAD, 7.5 credits, G1F
- Electrical measurements, 7.5 credits, G1F

Elective courses in computer science:
- Programming, C #, 7.5 credits, G1F
- Database Technology, 7.5 credits, G1F
- Database Theory, 7.5 credits, G1F
- Information Security, 7.5 credits, G1F
- Mobile and Wireless Security, 7.5 credits, G1F
- Object-Oriented Software Engineering, 15 credits, G1F
- Computer Graphics, 7.5 credits, G2F
- Artificial Intelligence, 7.5 credits, G2F
- Programming Language Theory, 7.5 credits, G2F
- Software Architectures, 7.5 credits, G2F
- Compiler Construction, 7.5 credits, G2F

Required depth of the main subject:
- Degree project, 15 credits, G2E

Work Experience
The department of electrical and computer technology has contacts with numerous companies in the region. Approximately 30 of these companies are part of the Embedded Systems Network. Students on the programme are invited to the network's seminars, normally 3-4 times per year. The seminars usually take place at Linnaeus University in Växjö.
These are usually done in cooperation with a company, often at a company in the Embedded Systems Network.

Studies abroad
In semester 5, there is possibility to study one semester at a university abroad.

Scope of the programme
Working as an engineer in computer science often involves working in an international, multi-faceted environment where collaboration with people of different nationality, sex, religion, etc. is important. Sustainable development includes: to reduce energy consumption, which can often be with the help of embedded systems. These questions are therefore addressed in the relevant courses, both in subject courses but also courses in the field of TMS, Technology, Man and Society. There is a stated ambition that the students during their studies take advantage of various international meetings such as foreign visiting lecturers and joint training sessions with international students.

Quality Development

The program is evaluated through periodic written and oral evaluations. Students from all grades in the program are invited to annual evaluations, and summary of the evaluations will be available at DFM. Courses are evaluated by written questionnaire at the end of each course. Compilations of course evaluations filed at DFM are available to students. Each course introduction will include a summary of last course evaluation.

Degree Certificate

After completing studies at the program and then completed studies equivalent to the receivables that are stated in the Higher Education Ordinance degree and in the local of Qualifications for Linnaeus University student can apply for a degree. Those who completed the Computer Engineering Programme, can obtain the following qualification:
Högskoleingenjörsexamen
Datateknik

Bachelor of Science in Engineering
Computer Science

The diploma is bilingual (Swedish / English). This certificate accompanied by a Diploma Supplement (in English).

Other Information

For the commencement of semester 3 requires that at least 75% of the courses from year 1 are completed. For the commencement of semester 5 requires that at least 75% of the courses from year 1 and year 2 are completed. If these limits are not reached an individual study plan should be established. The program director is responsible for this. The program includes travel for business visits. This may imply some additional costs for the students.