



HÖGSKOLAN I GÄVLE

PROGRAMME SYLLABUS

FIRST CYCLE

**STUDY PROGRAMME IN COMPUTER SCIENCE
AND GEOGRAPHICAL INFORMATION
TECHNOLOGY**

Programme Code: TGITK

Established by the Faculty Board

2010-09-23

Programme Syllabus

**Programme in Computer Science and
Geographical Information Technology,
180 HE credits**

*(IT/GIS - informationsteknologi med GIS-inriktning
180 högskolepoäng)*

This programme syllabus applies to students admitted to the autumn semester of 2011 or later.

STUDY PROGRAMME IN COMPUTER SCIENCE AND GEOGRAPHICAL INFORMATION TECHNOLOGY

at Högskolan i Gävle

1 General Arrangement

The Study Programme in Computer Science and Geographical Information Technology combines courses to a higher education qualification where experience shows that it is a qualification that the labour market is interested in. The programme results in a Bachelor of Arts with a major in Computer Science and a specialisation in Geographical Information Technology. A degree project of at least 15 HE credits should be carried out in the main field of study. Depending on prior knowledge and supplementary qualifications, the requirements for Bachelor of Science in Engineering and/or Bachelor of Science, may be fulfilled.

2 Expected Learning Outcomes

2.1 Expected Learning Outcomes for First-cycle Programmes According to the Higher Education Act, Chapter 1, Section 8, and Qualification Descriptor According to the Higher Education Ordinance, Appendix 2

2.1.1 Expected Learning Outcomes for First-cycle Programmes According to the Higher Education Act, Chapter 1, Section 8

First-cycle studies should essentially expand upon the knowledge that pupils acquire on national or specially designed programmes in upper-secondary school, or equivalent knowledge. The government may, however, grant exemptions regarding programmes in fine, applied and performing arts.

First-cycle studies should develop the students

- ability to make independent and critical assessments
- ability to independently discern, formulate and solve problems, and
- preparedness to address changes in the working life.

Within the field of the education, the students should, in addition to knowledge and skills, develop the ability to

- search and evaluate knowledge on an academic level
- follow the knowledge development, and
- exchange knowledge also with individuals without expertise in the area.

2.1.2 Qualification Descriptor According to the Higher Education Ordinance, Appendix 22

2.1.2.1 Bachelor's Degree

Extent

Bachelor's degree is achieved when the student has successfully completed required courses of 180 HE credits with certain specialisation decided by each higher education institution, including at least 90 HE credits of progressive specialisation in the programme's main field of study.

Expected Learning Outcomes

Knowledge and Understanding

For a bachelor's degree, the student should

- demonstrate knowledge and understanding in the programme's main field of study, including knowledge of the disciplinary foundation of the field, knowledge of applicable methods in the area, advanced studies in some part of the field and orientation in current research.

Skills and Abilities

For a bachelor's degree, the student should

- demonstrate the ability to search for, collect, evaluate and critically interpret relevant information in a problem, and to critically discuss phenomena, issues and situations
- demonstrate the ability to independently identify, formulate and solve problems and to carry out assignments within given time frames,
- demonstrate the ability to account for and discuss information, problems and solutions in dialogue with different groups, orally and in writing, and
- demonstrate the skills required to work independently within the field of the education.

Judgement and Approach

For a bachelor's degree, the student should

- demonstrate the ability to make assessments with consideration to relevant scientific, social and ethical aspects, within the programme's main field of study
- demonstrate an understanding of the role of knowledge in society and of people's responsibility for how it is used, and
- demonstrate the ability to identify the own need of additional knowledge and to develop the own skills.

Thesis (degree project)

For a bachelor's degree, the student must have successfully completed an individual assignment (degree project) of at least 15 HE credits within the programme's main field of study, and within the framework of the required courses.

Other

For a bachelor's degree with a certain specialisation, the specific requirements decided by each higher education institution within the framework of the requirements in this qualification descriptor, should also apply.

2.1.2.2 Bachelor of Science in Engineering

Extent

Bachelor of Science in Engineering is achieved when the student has successfully completed required courses of 180 HE credits.

Expected Learning Outcomes

For a Bachelor of Science in Engineering, the student should demonstrate the knowledge and abilities required to work independently as an engineer.

Knowledge and Understanding

For a Bachelor of Science in Engineering, the student should

- demonstrate knowledge of the disciplinary foundation of the chosen field of technology and its best practice, and knowledge of current research and development
- demonstrate a broad expertise in the chosen technological field and relevant knowledge in mathematics and natural sciences

Skills and Abilities

For a Bachelor of Science in Engineering, the student should:

- demonstrate the ability to independently and creatively identify, formulate and handle issues and analyse and evaluate different technical solutions, with a comprehensive view
- demonstrate the ability to plan and, with adequate methods, carry out assignments within given frames
- demonstrate the ability to critically and systematically use knowledge, and to model, simulate, predict and evaluate developments based on relevant information
- demonstrate the ability to design and handle products, processes and systems with consideration to the conditions and needs of people and the targets of society for economic, social and ecological sustainable development
- demonstrate the ability to work in teams and cooperate in groups with different compositions
- demonstrate the ability to account for and discuss information, problems and solutions in dialogue with different groups, orally and in writing

Judgement and Approach

For a Bachelor of Science in Engineering, the student should:

- demonstrate the ability to make assessments with consideration to relevant scientific, social and ethical aspects
- demonstrate an understanding of the possibilities and limitations of technology, its role in society and people's responsibility for its use, including social and economic aspects and environmental and working environment aspects
- demonstrate the ability to identify the own need of additional knowledge and to continuously develop the own skills

Thesis (degree project)

For a Bachelor of Science in Engineering, the student must have successfully completed an individual assignment (degree project) of at least 15 HE credits, within the framework of the required courses.

Other

For a Bachelor of Science in Engineering, the specific requirements decided by each higher education institution within the framework of the requirements in this qualification descriptor should also apply.

2.2 Specific Expected Learning Outcomes for the Programme

The purpose of the education is to provide knowledge and skills on a scientific basis,

for employment in the area of information technology, particularly with a specialisation in geographical information and application development. The programme also provides a basis for continued studies in the area.

After completed education, the student should be able to

Knowledge and Understanding

- define, explain and use central concepts in computer science and thereby show familiarity with the basics of information technology
- define, explain and use central concepts in modelling of business processes and design of software solutions
- define, explain and with a social attitude, use central concepts in visualisation, graphics and decision making
- the basics of geomatics, especially geographical information technology
- use modern instruments and programs in the area of geomatics
- work in and carry out projects.

Skills and Abilities

- demonstrate the ability to identify, formulate, discuss and solve problems in information technology, both individually and in groups and within given time frames
- handle geographic information
- understand society's need for geographic infrastructure
- account for and discuss information, problems and solutions in dialogue with different groups, orally and in writing
- apply established methods and principles of systems and software development, and evaluate different methods and choose an appropriate method for a given application
- create, interpret, evaluate and compare visualisations of different kinds
- integrate knowledge of geographical informatics and computer science to create, analyse and evaluate geographical information technology
- create, analyse and evaluate user-friendly applications based on knowledge of people's attitudes
- demonstrate the ability to interpret and write references
- account for the differences between scholarly material and other types of materials.

Judgement and Approach

- demonstrate the ability to make assessments in information technology, considering relevant scientific, social and ethical aspects
- demonstrate an understanding of the role of information technology in society, and of people's responsibility for how it is used, and promote a sustainable development in the production of applications by integrating ethical and humanistic aspects in the work
- demonstrate an approach to knowledge characterised by an active, responsible and self-reflecting way of studying, and the ability to follow the knowledge development in the own subject area
- demonstrate the ability to present criteria for assessment of sources of information.

3 Description of the Programme

3.1 Main Field of Study Computer Science

The emphasis of the education is on the area of information technology specialised in geographical information and application development.

The programme courses provide knowledge within e.g. modelling of business processes, software design, development of different applications in geographical information and integration between different systems. Knowledge of visualisation, graphics and decision making with a social specialisation are also important parts of the education.

Strong emphasis is placed on creating adapted tools for refinement of information and decision support in applications of advantage to society.

The programme ends with a degree project. The degree project is usually carried out in concentrated form at the end of the education. In certain cases, a pilot study of the degree project may be initiated one period earlier, in the course Scientific Theory and Writing. Through the degree project, knowledge acquired during previous studies should be applied, broadened and advanced. Through the degree project, the student should show that the aims for first-cycle programmes stated in the Higher Education Act, the aims for current higher education qualification and the specific aims stated in this programme syllabus have been achieved.

3.2 Teaching and Examination

3.2.1 Teaching

The educational view is based on the fact that all learning is an active, dynamic process which takes place in collaboration between teachers and students. All teaching and supervision should be based on the student taking own responsibility for the studies and for active knowledge acquisition. The learning implies that the theoretical and practical teaching in the courses should be integrated as useful knowledge and skills in each individual. In that way, the student is given the opportunity of personal development, which is of great importance for the future profession and a lifelong learning.

The student should also acquire preparedness to address changes and the ability to review the own knowledge to be able to actively participate in development and evaluation of the professional domain. Different teaching and working methods should teach the student to actively search for knowledge, critical thinking, reflection and oral and written proficiencies and in using academic literature. The teaching may partly be carried out in English, and English course literature may occur.

The progression of the education occurs through a progressive specialisation in the main field, both through in-depth subject studies and development of the scholarly approach.

3.2.2 Examination

Examination is carried out within the framework of the programme courses. The forms of examination are chosen in such a way that they give students the possibility to demonstrate the different knowledge and knowledge forms expressed by the expected learning outcomes. It implies that several different examination formats occur in the education, for example written and oral tests, oral and written presentations of laboratory sessions, written assignments and project assignments.

3.3 Student Influence

There is a council for educational affairs linked to the programme, which consists of representatives from the working life, teachers and students. The council for educational affairs is advisory, and the faculty programme director is the chairman. There are student representatives in the Board of Governors, the Faculty Board and the Academy Council. Gefle Student Union appoints student representatives.

3.4 Internationalisation

Högskolan i Gävle has a large international contact network and several agreements with higher education institutions and universities abroad. At the higher education institution, there is an international office that can give information about which exchanges are currently available at each given date.

3.5 Sustainable Development - Information Technology and Society

An important perspective of the programme is that the student must be able to view information technology from a social perspective. The student needs knowledge about and skills in managing products, processes and working environments with consideration to the preconditions and needs of people and to the targets of society concerning social relations, resource management, environment and economics. After the education, the student should integrate ethical and humanistic aspects and promote a sustainable development in the production of applications. Therefore, working methods that develop these abilities are important elements of the education.

4 Courses in the Programme

The students have guaranteed admission to the courses within the programme. Course applications for the following semester must be submitted. Changes in the order of courses may be made in consultation with the students on the programme. Changes in the programme courses are determined by the Faculty Board. Change of period when the course is given is determined on department level. Alternative course choices may be made in consultation with the faculty programme director, provided that the expected learning outcomes for the programme are fulfilled.

F = First Cycle.

Year 1

Period	Course Name	HE credits	Level	Main Field of Study
1:1	Introduction to Higher Education	5	F	Geomatics
1:1	Computational Methods for IT	10	F	Mathematics
1:2	Geographic Information	7.5	F	Geomatics
1:2-1:3	Computer Systems and Software Engineering	15	F	Computer Science
1:3	GIS Systems Analysis and	7.5	F	Computer
1:4	GIS Application Development	15	F	Computer Science

Year 2				
Period	Course Name	HE credits	Level	Main Field of Study
2:1	GIS Raster/Vector	7.5	F	Geomatics
2:1-2:2	Object-oriented Design, Programming and Algorithms	15	F	Computer Science
2:2-2:3	Mathematics and Statistics for Surveyors and Computer	15	F	Mathematics
2:3	Reference Systems and Positioning	5	F	Geomatics
2:3-2:4	GIS Application Development	10	F	Computer
2:4	Information and Communication Technology Security	7.5	F	Computer Science

Year 3				
Period	Course Name	HE credits	Level	Main Field of Study
3:1	SDI and GIS Architecture	15	F	Geomatics
3:2	GIS and Remote Sensing	7.5	F	Geomatics
3:2	Visualisation and Image Analysis	7.5	F	Computer
3:3	Scientific Theory and Writing	7.5	F	Computer
3:3	GIS Web Services and Open Source	7.5	F	Computer Science
3:4	Degree Project	15	F	Computer

5 Entry Requirements

Qualified for the Study Programme in Computer Science and Geographical Information Technology are those who both fulfil the conditions for general entry requirements stated in Higher Education Ordinance and fulfil the following specific entry requirements (specific entry requirements 4):

Subject	Course
English	EnB
Mathematics	MaC
Social Studies	ShA

The grade for each of the above subjects should be at least Pass or 3.

6 Grades

Grades are given for the programme courses according to relevant course syllabus.

7 Examination Regulations

7.1 Title of Qualification

Bachelor of Arts

Filosofie kandidatexamen

Bachelor of Science in Engineering

Högskoleingenjörsexamen

7.2 Qualification Criteria

To receive a certificate for a *Bachelor of Arts*, the student must have successfully completed courses of at least 180 HE credits in the programme or equivalent courses with a clear progression in the main field. The higher education qualification should include at least 90 HE credits with a progressive specialisation in the main field, where the course Scientific Theory and Writing and an individual degree project of 15 HE credits must be included.

To receive a certificate for a *Bachelor of Science*, the student must have successfully completed courses of at least 180 HE credits in the programme or equivalent courses with a clear progression in the main field. The higher education qualification should include at least 90 HE credits with a progressive specialisation in the main field, where the course Scientific Theory and Writing and an individual degree project of 15 HE credits, and mathematics, at least 15 HE credits, including 7.5 HE credits in linear algebra and 7.5 HE credits in calculus must be included.

7.3 Degree Certificates

Students who fulfil the requirements for a higher education qualification should receive a degree certificate on request. Each degree certificate must be followed by a diploma supplement that describes the education and its place in the education system (the Higher Education Ordinance, chapter 6, section 15). The appendix is called Diploma Supplement. The Diploma Supplement should facilitate recognition and credit transfer of a Swedish higher education qualification in employment and continued studies abroad, but also in Sweden.

8 Further Instructions

Interim Regulations

Students admitted to the programme's earlier years follow the programme syllabi for that year. For students admitted to the later part of the programme and for students who have had approved leave from studies, individual study plans are established by the faculty programme director.

Interim Regulations between Years

To be able to continue studying in the later years of the programme without restrictions, the student must have achieved at least 45 HE credits by the time of transition to year two. To be able to continue to year three, the student should have successfully completed at least 90 HE credits. For students who do not fulfil this requirement, individual study plans should be established in consultation with the faculty programme director.