



HÖGSKOLAN I GÄVLE

PROGRAMME SYLLABUS

STUDY PROGRAMME IN GEOMATICS

Programme Code: TGGEY

Specialisation Code GIS/Geographical Information
Technology: GISG

Specialisation Code Spatial Planning/Geography:
SAGE

Specialisation Code Higher Education Qualification:
HÖTE

Established by the Board of Science and Technology
2007-01-30

Revised by the Faculty Board
2010-09-23

Programme syllabus

Study Programme in Geomatics

GIS/Geographical Information Technology 180 HE credits

Spatial Planning/Geography 180 HE credits

Higher Education Qualification 120 HE credits

(Geomatikprogrammet, 180 hp)

This programme syllabus applies to students admitted to the autumn semester of 2010 or later

STUDY PROGRAMME IN GEOMATICS at Högskolan i Gävle

1 General Arrangement

The Study Programme in Geomatics combines courses into a higher education qualification, which, according to experience, the labour market is interested in. The different specialisations result in a Higher Education Qualification 120 HE credits, a Bachelor of Science in Engineering 180 HE credits, a Bachelor of Arts 180 HE credits or a Bachelor of Science 180 HE credits.

The Study Programme in Geomatics has a common first year for all specialisations, and a structure where the grade of project-based learning gradually increases. From more factual knowledge to pure projects and the final degree project.

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 shall essentially expand upon the knowledge that the 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
- 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 at a scholarly level
- follow the knowledge development
- exchange knowledge also with individuals without expertise in the area.

2.1.2 Qualification Descriptors According to the Higher Education Ordinance, Appendix 2

2.1.2.1 Higher Education Qualification

Extent

A higher education qualification is achieved when the student has successfully completed required courses of 120 HE credits with a certain specialisation decided by each higher education institution.

Expected Learning Outcomes

Knowledge and Understanding

For a higher education qualification, the student should:

- demonstrate knowledge and understanding of the programme's main field of study, including knowledge of the disciplinary foundation of the field and knowledge of some applicable methods in the area.

Skills and Abilities

For a higher education qualification, the student should:

- demonstrate the ability to search, collect and critically interpret relevant information to formulate replies to well-defined issues in the programme's main field of study
- demonstrate the ability to account for and discuss the own expertise with different groups
- demonstrate the skills required to work independently with certain assignments in the field of the education.

Judgement and Approach

For a higher education qualification, the student should:

- demonstrate knowledge of and have the skills to handle ethical issues in the programme's main field of study.

Thesis (degree project)

For a higher education qualification, the student should have successfully completed an individual assignment (degree project) within the framework of the required courses and in the programme's main field of study.

Other

For a higher education qualification 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.

In addition, the learning outcomes decided by each higher education institution apply (SFS 2002:1107)

2.1.2.2 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, 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
- 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, in 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
- 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.

2.1.2.3 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 field of technology, 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

2.2.1 Specific Expected Learning Outcomes for Higher Education Qualification

The purpose of the education is to provide knowledge and experience by collecting, handling and presenting geographic information using advanced computer technology, and provide skills in one of the fields: surveying/geodesy or geographical information technology.

Knowledge and Understanding

After completed education, the student should have understanding and knowledge of:

- Geomatics
- using modern instruments and programs in the main field of geomatics
- working in and carrying out projects.

Skills and Abilities

Through the education, the student should have developed the skills and abilities to:

- handle geographic information
- understand society's need for geographic infrastructure
- use and evaluate different working methods
- present results both orally and in writing
- demonstrate the ability to formulate search questions and seek information in relevant sources
- demonstrate the ability to interpret and write references
- be able to account for the differences between scholarly material and other types of material.

Judgement and Approach

After the education, the student should:

- demonstrate the ability to make assessments of working methods in the main field of study
- have knowledge and understanding of ethical values and issues in the main field of study
- be able to follow the knowledge development in the own subject area.

2.2.3 Specific Expected Learning Outcomes for GIS/Geographical Information Technology

The purpose of the education is to provide knowledge and experience by collecting, handling and presenting geographic information using advanced computer technology, and provide expertise in the area of geographical information technology.

Knowledge and Understanding

After completed education, the student should have understanding and knowledge of:

- Geomatics
- using modern instruments and programs in the main field of geomatics
- working in and carrying out projects.

Skills and Abilities

Through the education, the student should have developed the skills and abilities to:

- handle geographic information
- understand society's need for geographic infrastructure
- use and evaluate different working methods
- demonstrate the ability to work in the different roles of a project, including project management
- present results both orally and in writing
- demonstrate the ability to formulate search questions and seek information in relevant sources
- demonstrate the ability to interpret and write references
- be able to account for the differences between scholarly material and other types of material.

Judgement and Approach

After the education, the student should:

- demonstrate the ability to make assessments of working methods in the main field of study
- have knowledge and understanding of ethical values and issues in the main field of study
- be able to follow the knowledge development in the own subject area
- be familiar with the forms of scholarly communication and publication
- demonstrate the ability to review, analyse and evaluate both the search process and search results
- demonstrate the ability to present criteria for assessment of sources of information and application of these.

2.2.3 Specific Expected Learning Outcomes for Spatial Planning/Geography

The purpose of the education is to provide knowledge and experience by collecting, handling and presenting geographic information using advanced computer technology, and provide expertise in one of the fields of spatial planning or geography.

Knowledge and Understanding

After completed education, the student should have understanding and knowledge of:

- geomatics and geography and/or spatial planning
- using modern instruments and programs in the main field of geomatics
- working in and carrying out projects.

Skills and Abilities

Through the education, the student should have developed the skills and abilities to:

- handle geographic information
- understand society's need for geographic infrastructure
- use and evaluate different working methods
- demonstrate the ability to work in the different roles of a project, including project management
- present results both orally and in writing
- demonstrate the ability to formulate search questions and seek information in relevant sources
- demonstrate the ability to interpret and write references
- be able to account for the differences between scholarly material and other types of material.

Judgement and Approach

After the education, the student should:

- demonstrate the ability to make assessments of working methods in the main field of study
- have knowledge and understanding of ethical values and issues in the main field of study
- be able to follow the knowledge development in the own subject area
- be familiar with the forms of scholarly communication and publication
- demonstrate the ability to review, analyse and evaluate both the search process and search results
- demonstrate the ability to present criteria for assessment of sources of information and application of these.

3 Description of the Programme

3.1 Main Fields of Study

The programme includes three main fields of study:

- Geomatics, which is an internationally recognised term for individual academic disciplines related to geographic information. These include: photogrammetry, geodesy, surveying, cartography, geographical information technology (GIT) and remote sensing. GIT concerns management of geographic information, especially in geographic information systems (GIS). Courses in these disciplines are sometimes identical to courses in geography and spatial planning.
- Geography provides understanding and a comprehensive view of the Earth as the human living-space and of how to dispose of the Earth's surface. The subject is usually divided into physical geography and human geography. Physical geography describes and explains the landscape environment and its changes through natural processes and human influence. Human geography studies the spreading of and the relationships between phenomena on Earth's surface that can be related to humans and their activities.
- Spatial planning concerns the physical environment. The connection to ecology and environmental issues are important. Environmental consequences and impact assessments in general are used more and more. Cultural environments, historical development, GIS and legislation are also important parts in modern planning.

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 the development and evaluation

of the professional domain.

Different teaching and working methods should teach the student to actively seek knowledge, critical thinking, reflection and oral and written proficiency training, and to be able to use scholarly course literature. Starting year two, the teaching may be carried out in English, and English course literature may occur.

The progression of the education occurs through a progressive specialisation in the chosen main field of study, both through in-depth subject studies and development of the scientific approach, and through improved skills in relation to the future profession through project courses and the final degree project.

3.2.2 Examination

Varying examination formats are applied in the programme courses.

The format is adapted to the different course requirements on examination formats. Written assignments, written and oral tests occur, individually and in groups. The design, extent and duration of the tests are adapted to the expected learning outcomes stated for respective course. The expected learning outcomes and the examination should also be put in relation to the working life demands on knowledge and skills.

3.3 Placement

Placement at workplaces that provide an insight into and preparation for the future working life is recommended.

The higher education institution does not provide placements.

3.4 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. Gefle Student Union appoints student representatives. Apart from the council for educational affairs, the students may participate in the activities of the higher education institution through representatives in the different boards and councils, where students should be represented according to ordinances.

3.5 Internationalisation

Within the field of geomatics, there is opportunity for international exchange, both for students and for teachers. Högskolan i Gävle (HiG) currently has exchange agreements in geomatics with Università degli Studi di Cagliari in Italy, Thompson Rivers University in Canada, Universidad de Extremadura and Universidad Politécnica de Valencia in Spain and Fachhochschule in Mainz and Fachhochschule in Munich in Germany. Exchange studies may result in prolonged programme length. Extended studies resulting in double higher education qualifications as well as individual courses and degree projects are possible. Similarly, HiG may receive exchange students from stated higher education institutions.

When there are exchange students or non-Swedish speaking lecturers, the programme courses are given in English. The course literature is usually in English. Assessment and credit transfer of courses studied abroad are handled by the head of department in Spatial Planning at the Faculty of Engineering and

Sustainable Development at HiG.

3.6 Sustainable Development - Technology and Society

An important starting point for the education is that students on the Study Programme in Geomatics must be able to view new 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 be able to take human science and environmental requirements in problem-solving and product development into account, and have the conditions to promote an environmentally adapted technology. Working methods exercising these abilities are therefore important elements in 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 students in 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.

All programme courses are given, if nothing else is stated, as first-cycle courses = F, GM = Geomatics, GG = Geography, SP = Spatial Planning.

4.1 Joint Study Path for Year 1

| Year 1 | | | | |
|---------------|--|-------------------|--------------|----------------------------|
| Period | Course Name | HE credits | Level | Main Field of Study |
| 1:1 | Introduction to Higher Education | 5 | F | GM/GG/SP |
| 1:1 | Introduction to Spatial Planning | 10 | F | GG/SP |
| 1:2 | Cartography 1 | 7.5 | F | GM/GG/SP |
| 1:2 | <i>Geovisualisation in Built Environment</i> | 7.5 | F | GM/SP |
| 1:3 | <i>Basic Property Legislation</i> | 7.5 | F | GM/SP |
| 1:3 | Geographic Information Technology I | 7.5 | F | GM/GG/SP |
| 1:4 | Basic Surveying | 7.5 | F | GM/GG |
| 1:4 | <i>Programming in Visual Basic .NET</i> | 7.5 | F | Computer Science |
| | or Earth Science I | 7.5 | F | GG |

4.2 Study Path for Higher Education Qualification - Study Programme in Geomatics

| Year 2 | | | | |
|---------------|---|-------------------|--------------|----------------------------|
| Period | Course Name | HE credits | Level | Main Field of Study |
| 2:1 | Field Training in Land Surveying or | 7.5 | F | GM |
| | Cartography II or | 7.5 | F | GM/GG/SP |
| | GIS Raster/vector | 7.5 | F | GM/GG/SP |
| 2:2 | GIS Application Development or | 7.5 | F | GM |
| | RS & GIS analysis in LM or | 7.5 | F | GM/GG/SP |
| | Physical planning and detailed development planning | 7.5 | F | SP |
| 2:3 | Building Surveying or | 7.5 | F | GM |
| | Digital Photogrammetry or | 7.5 | F | GM |
| | Human Geography alt. | 7.5 | F | GG |
| | Environmental Geography alt. | 7.5 | F | GG |
| | Web mapping | 7.5 | F | GM |
| 2:4 | Geodetic Instruments alt. | 7.5 | F | GM |
| | GIS Databases or Building | 7.5 | F | GM |
| | Surveying II or | 7.5 | F | GM/SP |
| | Comprehensive Spatial Planning and | 7.5 | F | SP |
| | Degree Project | 7.5 | F | GM |

4.3 Study Path for GIS/Geographical Information Technology - Study Programme in Geomatics

| Year 2 | | | | |
|---------------|---|-------------------|--------------|----------------------------|
| Period | Course Name | HE credits | Level | Main Field of Study |
| 2:1 | Linear Algebra or | 7.5 | F | Mathematics |
| | CartographyII or | 7.5 | F | GM |
| | GIS Raster/vector | 7.5 | F | GM/GG/SP |
| 2:2 | Calculus or | 7.5 | F | Mathematics |
| | GIS Application Development or Sustainable Spatial Planning | 7.5 | F | GM SP/GG |
| 2:3 | Web mapping or | 7.5 | F | GM |
| | Digital Photogrammetry | 7.5 | F | GM |
| | Human Geography or | 7.5 | F | GG |
| 2:4 | Geodetiska Instruments or | 7.5 | F | GM |
| | GIS Databases or | 7.5 | F | GM |
| | Integrated IT/GI-systems | 7.5 | F | GM |

Year 3

| Period | Course Name | HE credits | Level | Main Field of Study |
|---------------|--|-------------------|--------------|----------------------------|
| 3:1 | Field Training in Land Surveying or | 7.5 | F | GM |
| | Physical Geography or Terrestrial and | 7.5 | F | GG |
| | Airborne Laser Scanning | 7.5 | F | GM |
| 3:2 | RS & GIS Analysis in LM | 7.5 | F | GM |
| | Physical Planning and Detailed Development | 7.5 | F | SP |
| 3:3 | Building Surveying or | 7.5 | F | GM |
| | Environmental Geography or Human | 7.5 | F | GG |
| | Geography | | | GG |
| 3:4 | Scientific Theory and Writing | 7.5 | F | GM/GG/SP |
| | Degree Project | 15 | F | GM |

4.3 Study Path for Spatial Planning/Geography - Study Programme in Geomatics**Year 2**

| Period | Course Name | HE credits | Level | Main Field of Study |
|---------------|--|-------------------|--------------|----------------------------|
| 2:1 | Linear Algebra or | 7.5 | F | Mathematics |
| | Cartography II or GIS | 7.5 | F | GM |
| | Raster/vector or | 7.5 | F | GM/GG/SP |
| | Physical Geography | 7.5 | F | GG |
| 2:2 | Calculus | 7.5 | F | Mathematics |
| | Sustainable spatial planning or RS | 7.5 | F | SP/GG |
| | & GIS Analysis in LM or Physical Planning and Detailed Development | 7.5 | F | GM SP |
| 2:3 | Environmental | 7.5 | F | SP |
| | Impact Assessment or Human Geo. | 7.5 | F | GG |
| 2:4 | Spatial and Comprehensive | 7.5 | F | SP |
| | Planning or Regional | | | |
| | Development or Property | 7.5 | F | SP/GG |
| | Legislation II | 7.5 | F | GM/SP |

Year 3

| Period | Course Name | HE credits | Level | Main Field of Study |
|--------|----------------------------------|------------|-------|---------------------|
| 3:1 | Field Training in Land Surveying | 7.5 | F | GM |
| | or | 7.5 | F | GG |
| | Physical Geography or | 7.5 | F | GG/SP |
| 2:2 | Urban studies or | 7.5 | F | GG/SP |
| | RS & GIS Analysis in LM | 7.5 | F | GM |
| 3:3 | Building Surveying or | 7.5 | F | GM |
| | Environmental Geography or | 7.5 | F | GG |
| | Scientific Theory and Writing | 7.5 | F | GM/GG/SP |
| 3:4 | Degree Project | 15 | F | GM/GG/SP |

5 Entry Requirements

For entry GIS/Geographical Information Technology and Spatial Planning/Geography, general entry requirements, specific entry requirements 4 and the following specific entry requirements apply:

| Subject | Course |
|----------------|--------|
| English | EnB |
| Mathematics | MaC |
| Social Studies | ShA |

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

For entry Higher Education Qualification, general entry requirements, specific entry requirements 7 and the following specific entry requirements apply:

| Subject | Course |
|-------------|--------|
| Mathematics | Ma B |

The grade in mathematics must be at least Pass.

6 Grades

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

7 Examination Regulations

7.1 Title of Qualification

University Diploma

Högskoleexamen

Bachelor of Arts

Filosofie kandidatexamen

Bachelor of Science in Engineering

Högskoleingenjörsexamen

Bachelor of Science

Teknologie kandidatexamen

7.2 Qualification Criteria

To receive a higher education qualification in one of the main fields of Geomatics, Spatial Planning or Geography, the courses within the study path must be successfully completed.

For a higher education qualification, the following applies:

- the study path according to Section 4.1, or equivalent credit transfer, is successfully completed
- a total of at least 60 HE credits in the main field of geomatics
- a degree project of 7.5 HE credits in the main field of geomatics is successfully completed.

For a bachelor's degree in Geography, the following applies:

- the study path according to Section 4.1, or equivalent credit transfer, is successfully completed
- a total of at least 90 HE credits in the main field of geography
- courses in both physical and human geography are included (at least 15 HE credits each)
- the course Scientific Theory and Writing 7.5 HE credits is included
- a degree project of 15 HE credits in the main field of geography is successfully completed.

For a bachelor's degree in Geomatics or Spatial Planning, the following applies:

- the courses within the study path should be successfully completed and:
- the study path according to Section 4.1, or equivalent credit transfer, is successfully completed
- a total of at least 90 HE credits in either the main field of geomatics or spatial planning
- the course Scientific Theory and Writing 7.5 HE credits is included
- a degree project of 15 HE credits in either the main field of geomatics or spatial planning is successfully completed.

For a Bachelor of Science in Engineering in Geomatics or Spatial Planning, the following applies:

- the courses within the study path should be successfully completed and:
- the study path according to Section 4.1, or equivalent credit transfer, is

- successfully completed
- at least 15 HE credits in mathematics (with linear algebra and calculus) is included
- a total of at least 90 HE credits in either the main field of geomatics or spatial planning
- the course Scientific Theory and Writing 7.5 HE credits is included
- a degree project of 15 HE credits in either the main field of geomatics or spatial planning is successfully completed.

For a Bachelor of Science in Geomatics, the following applies:

- the study path according to Section 4.1, or equivalent credit transfer, is successfully completed
- at least 30 HE credits in mathematics (with linear algebra and calculus) is included
- a total of at least 90 HE credits in the main field of geomatics
- the course Scientific Theory and Writing 7.5 HE credits is included
- a degree project of 15 HE credits in the main field of geomatics is successfully completed

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. 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 earlier years of the Study Programme in Geomatics 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, a specific study plan is established by the faculty programme director.