



Faculty of Health, Science and Technology

Study Plan

Engineering Programme in Surveying Technology and Geographical IT

Programme Code:	TGLIT
Programme Title:	Engineering: Surveying Technology and Geographical IT
Credits:	180
Approval:	The Programme Study Plan was approved by the Faculty Board of Health, Science and Technology on 23 February 2015, revised 24 February 2017 (HNT 2017/111) and is valid from the autumn semester of 2017
Language of Instruction:	Swedish and English
Degree Level:	Bachelor
Degree Type:	Professional
Prerequisites:	General admission requirements plus upper secondary level - Physics 1, Chemistry 1, Mathematics 3c OR - Physics B, Chemistry A, Mathematics D, Physics A (field-specific eligibilities A8 or 8, with Physics 1 or A instead of 2 or B)

Introduction

The programme prepares for professional work in the area of digital geospatial information with a focus on surveying technology and geographical IT. Examples of work areas for graduates are:

- geographic data collection and database administration
- development and adaptation of software applications in GIT
- land surveying and geodetic measurement techniques

- physical planning and environmental and natural resource inventory in municipal technological administrations and services.

GIS engineers have different job positions: graduates can work as GIS or GIT engineers, GIS specialists, land surveying engineers, consultants, application developers, GIS coordinators or cartography and measurement engineers. Students will be qualified to work in consulting firms, construction companies, energy companies, municipalities, county council administrations and other government authorities. Graduates are attractive on the international job market.

The programme Surveying Technology and Geographical IT at Karlstad University offers the choice of three specializations:

- application development
- land-use planning
- geomatics

The specialization area of application development includes studies of graphic interface, web development, program development and design, among other things. The land-use planning specialization includes human geography based perspectives on planning. The geomatics specialization includes studies in geodetic measuring techniques, GNSS (Global Navigation Satellite System) and geographical analyses.

Students are awarded a Bachelor of Science Degree in Engineering on completion of 180 ECTS cr. Students can then choose to continue towards a Master's degree.

Objectives

For a Degree of Bachelor of Science in Engineering the student shall demonstrate the knowledge and skills required to work independently as a graduate engineer.

Undergraduate education should develop the student's ability:

- to make independent and critical judgements,
- to identify, formulate and solve problems independently, and
- to deal with changes at work.

In addition to the knowledge and skills required within the specific field of study, the students should develop the ability:

- to gather and interpret research information and data,
- to follow the developments in the field, and
- to communicate field-related information to non-specialists.

(Chapter 1, §8 of the Higher Education Act, SFS 1992:1434.)

The Higher Education Ordinance, Annex 2 (SFS 1993:100) specifies the requirements for a certain degree. The requirements are:

Knowledge and understanding

For a Degree of Bachelor of Science in Engineering the student shall

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

Competence and skills

For a Degree of Bachelor of Science in Engineering the student shall

- demonstrate the ability to identify, formulate and deal with issues independently and creatively using a holistic approach and to analyse and evaluate technological solutions
- demonstrate the ability to plan and using appropriate methods undertake tasks within

- predetermined parameters
- demonstrate the ability to use knowledge critically and systematically to model, simulate, predict and evaluate series of events on the basis of relevant information
- demonstrate 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
- 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 in Engineering the student shall

- demonstrate the ability to make assessments informed by relevant disciplinary, social and ethical aspects
- demonstrate 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, and
- demonstrate the ability to identify the need for further knowledge and undertake ongoing development of his or her skills.

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.

Upon completion of the Engineering: Surveying Technology and Geographical IT Programme at Karlstad University, students should, in addition, be able to

- set up, maintain and adapt geographical information systems,
- plan and carry out GIS projects in the industry and in the public sector,
- make use of existing infrastructure in society in collecting geographic information,
- use geographical databases
- give an account of different standards for modelling, storing and transferring geographic data and the ability to discuss data quality,
- use modern geodetic instruments and software for data collection,
- analyse geodetic data,
- create, structure and maintain geographic databases,
- implement relevant theories on set-ups, adaptation and use of the reference systems that are used in Sweden.

Programme Structure

Students take a number of introductory core courses in mathematics, surveying technology, geodesy, GIT, database technology and programming in their first year on the programme. In the second year students study advanced and application course in GIT, remote sensing, and physical geography. In the first semester of year three students take a number of elective courses in the field or in other subjects. Elective courses can be taken at other universities and institutions in Sweden or abroad.

Students in their third year have the opportunity to establish contact in the occupation by taking a practical placement course.

The degree programme is concluded with a degree project, preferably carried out in cooperation with a company, public agency, etc.

Programme curriculum

The programme includes the following courses:

<i>Required courses</i>	<i>Credits</i>
Introductory Course to GIS and Surveying and Cartography	7.5
Mathematics for engineering I	7.5
Mathematics for GIS engineering II	7.5
Basic Programmingcourse ¹	7.5
Database Techniques	7.5
Geodesy	7.5
Basic Property Law	7.5
GIS I	7.5
Cartography	7.5
Physical Geography and GIS	7.5
GIS II	7.5
GIS Raster	7.5
GIS III, Data Input	7.5
Geodesy for GIS	7.5
GIS analysis	7.5
Remote Sensing and Photogrammetry	7.5
Degree Project (minimum of)	15
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Tot	120 ECTS cr
<i>Optional courses</i>	
Program Developmentmethods	7.5
or	
General project Management	7.5
Graphical User Interface	7.5
or	
Methods	7.5
or	
Digital Photogrammetry and 3D visualisation	7.5
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Tot.	15 (of 30) ECTS cr
<i>Recommended electives</i>	
Autumn term	
Operative Systems	7.5
Community Planning I	7.5
Applied Geodesy	7.5
Global Navigation Satellite Systems (GNSS)	7.5
Practical Placement GIT	7.5-15
Web Development	7.5
Spring term	
Construction Measuring	7.5
Practical Placement GIT	7.5-15

¹ Basic Programming och programmingteknique

Degree Title

Bachelor of Science in Engineering. Major in Surveying Technology and Geographical IT

Credit Transfer

Students have the right to transfer credits from other universities in Sweden or abroad subject to approval according to current regulations.

Additional Information

Local regulations at Karlstad University stipulate the rights and obligations of staff and students.