



FACULTY OF HEALTH, SCIENCE AND TECHNOLOGY

Engineering: Surveying Technology and Geographical IT

*Högskoleingenjörsprogrammet i lantmäteriteknik
och geografisk IT*

Programme code: TGLIT

ECTS Credits: 180

Education level: First cycle

Degree type: Professional qualification

Language of instruction: Swedish and English

Finalized by

Faculty Board of Health, Science and Technology, 2025-12-11

Valid from

Autumn semester 2026

Entry requirements

General admission requirements

And

Mathematics 3c, Physics 1, and Chemistry 1

Or:

Mathematics - Further level 1c, Physics, level 1, Chemistry, level 1

Introduction

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

- geographical data collection and database administration
- development and adaptation of software applications in GIT
- land surveying and geodetic measurement techniques
- geodata management within the built environment process in municipal technological administrations and services

Programme outcomes

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

Undergraduate education shall develop

- the ability of students to make independent and critical assessments
- the ability of students to identify, formulate and solve problems autonomously, and
- the preparedness of students to deal with changes in working life.

In addition to knowledge and skills in their field of study, students shall develop the ability to:

- gather and interpret information at a scholarly level
- stay abreast of the development of knowledge, and
- communicate their knowledge to others, including those who lack specialist knowledge in the field.

(Chap. 1 Sect. 8, Higher Education Act, SFS 1992:1434)

The Higher Education Ordinance, System of Qualifications, specifies the outcomes required for a certain degree (SFS 1993:100). The outcomes are as follows:

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 autonomously 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.

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.

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

- set up, maintain and adapt geographic information systems (GIS)
- 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 geographic 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 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 and third year, students take specialisation courses and application courses, primarily in GIT. During semester four, five and six, students can take optional courses in the field or in other predefined subjects (physical geography/geoscience, geomatics, computer science, information systems, mathematics, CAD, project management, human geography, environmental science).

Students can also choose to do an internship and gain professional experience through optional courses offered during semester four as well as the third year of the programme.

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

Programme curriculum

The programme includes the following courses:

Mandatory courses, 150 credits

- *Introduction to geomatics* 7.5
- *Mathematics for engineers I* 7.5
- *Geometry, trigonometry and statistics* 7.5
- *Programming within geomatics* 7.5
- *Databases design within geomatics* 7.5
- *Geodesy* 7.5
- *Introduction to estate law* 7.5
- *Geographic information technology* 7.5
- *Cartography* 7.5
- *Raster analysis and modelling* 7.5
- *Applied geographic information technology* 7.5
- *Geodata management with FME* 7.5
- *Remote sensing and photogrammetry* 7.5
- *Geospatial technology with open source* 7.5
- *Projectwork in geomatics* 7.5
- *Map projections and coordinate transformations* 7.5
- *Scientific theory and methods in geomatics* 7.5
- *Degree project* 22.5

Optional courses, 30 credits

Students can choose optional courses in physical geography/ geoscience, geomatics, computer science, information systems, mathematics, CAD, project management, human geography, environmental science or take a practical placement course.

Title of qualification

Degree of Bachelor of Science in Engineering - Surveying Technology and Geographical IT

Credit transfer

Students have the right to transfer credits from previously completed university courses in Sweden or abroad, subject to approval according to the current regulations.

Additional information

The local regulations for first and second cycle education at Karlstad University stipulate the obligations and rights of students and staff.

This programme syllabus will replace the previous version approved 1 february 2024 (HNT 2024/51).