



Faculty of Health, Science and Technology
Geo-Science

Syllabus

GIS Principles

Course Code:	GMAN02
Course Title:	GIS Principles <i>GIS-principer</i>
Credits:	7.5
Degree Level:	Master's level
Progressive Specialisation:	Second cycle, has only first-cycle course/s as entry requirements (A1N)

Major Field of Study:
GEM (Geomatics)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2026-02-19, and is valid from the Autumn semester 2026 at Karlstad University.

Prerequisites

60 ECTS credits completed in undergraduate courses in a Science or Technology programme. In addition, upper secondary level English 6 or English level 2. An equivalence assessment can be made.

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe the fundamental principles and structure of Geographic Information Systems (GIS), including the main components and functionality,
2. identify and use different types of geospatial data, and convert between common data formats,
3. describe and distinguish between vector and raster data models and their appropriate applications,
4. explain and apply spatial referencing systems and map projections,
5. perform and interpret spatial analysis in both web-based and desktop GIS platforms,
6. apply and justify cartographic design principles to create clear, informative, and aesthetic maps,
7. analyse and critically discuss the role of GIS as a Spatial Decision Support System (SDSS) in environmental assessment and sustainable development, and
8. conduct GIS-based analyses of real-world problems and communicate analytical results effectively in written and visual form.

Content

The course is designed primarily for students who want to learn how to use GIS technology, while also serving those seeking a basic understanding of GIS concepts and principles. It introduces key geospatial concepts, definitions, and provides an overview of geospatial analysis within GIS.

Students engage with selected readings and assignments throughout the course. They are introduced to GIS software and complete introductory and advanced exercises designed to support the learning and use of open-source programs to deepen and apply knowledge in practice. Students are also introduced to internationally accepted standards for geospatial data. Finally, students undertake a project in demonstration of the acquired knowledge.

A major component in the course is exploration of GIS contributions to sustainable development. This includes applications in diverse fields in need of geospatial data and analysis such as spatial planning, environmental

monitoring, and natural resource management. Students analyse case studies where GIS supports spatial decision-making and reflect on ethical and societal implications of geospatial data use.

Reading List

See separate document.

Examination

Assessment is partly based on individual hand-in assignments and partly on a written project report, completed individually or in groups, and presented and discussed in a seminar. Submissions for assessment must clearly indicate individual contributions.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course, including for Engineering students.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

Students must be able to verify their identity at the seminar.

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.