Faculty of Health, Science and Technology
Geo-Science

Syllabus

Remote Sensing Principles

Course Code:	GMAN01
Course Title:	Remote Sensing Principles *Fjärranalysprinciper*
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 2026-02-18, and is valid from the Autumn semester 2026 at Karlstad University.

Prerequisites
7.5 credits in Geographic Information Systems (GIS) or Geographic Information Technology or Geostatistics. 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 and explain the physical principles and theoretical foundations that underpin data acquisition in remote sensing,
2. use tools and operations in both web-based and open-source remote sensing platforms,
3. process and analyse image datasets acquired by remote sensing sensors,
4. compare and evaluate the use of image datasets through application in real-world cases, and
5. explain and communicate the results of image analysis effectively through maps and in written form.

Content
Remote Sensing Principles is designed as an introductory course for beginners who want to learn how to use Earth Observation data and technologies. It also serves those seeking a basic understanding of satellite image data acquisition and manipulation using freely available data and open source programs. The course provides an overview of fundamental concepts and the physical and theoretical foundations of remote sensing, with particular emphasis on the electromagnetic spectrum and its relevance for image acquisition.

Remote sensing relies on detecting reflected or emitted energy across the electromagnetic spectrum using sensors mounted on airborne to spaceborne platforms. As a basis for image processing and interpretation, students will acquire knowledge of atmospheric interactions with electromagnetic energy and the spectral responses of natural and man-made features such as vegetation, water, soil, and built environments.

The course is structured as lectures with accompanying practical sessions with exercises. These exercises introduce students to image preprocessing, enhancement, compositing, and classification, including accuracy assessment. Students engage with selected readings and assignments to deepen their understanding and build their capacity to conduct assessments of real world case studies across diverse domains that rely on remote sensing data. They conclude with a project demonstrating the knowledge and skills acquired in the course.

Reading List

See separate document.

Examination
Assessment is based on individual hand-in assignments and a written project report, completed individually or in groups, using Earth Observation data. The project must be 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,

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
At the seminar, students must be able to verify their identity.

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