PROGRAMME SYLLABUS

Finalized 28 May 2026

FACULTY OF HEALTH, SCIENCE AND TECHNOLOGY

GeoAI for Sustainable Futures

GeoAI för hållbara framtider

Programme code: TAMGM

Credits: 120
Education level: Second cycle
Degree type: General qualification
Language of instruction: English

Approved by

Faculty Board of Health, Science and Technology, 28 May 2026

Effective from

Autumn semester 2027

Entry requirements

Completed bachelor's degree or vocational degree comprising at least 180 credits, or equivalent foreign degree in a relevant field, such as geographic IT, geoinformatics, surveying technology, computer science, environmental science, or geography. High school English 6 or Enlish level 2, or equivalent.

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General information

GeoAI for Sustainable Futures leads to a master's degree with geomatics as the main field of study. The programme combines geographic information management with artificial intelligence (AI) to address societal challenges related to climate change, sustainable development and risk management. After graduation, students will be able to work with analysis, modelling and decision support based on large geodata and AI methods in, for example, government agencies, consulting firms, technology companies and research environments. Examples of job titles include GeoAI analyst, GIS developer, climate analyst, geodata data engineer and decision support specialist. The programme also prepares students for further studies at the doctoral level.

The GeoAI for Sustainable Futures programme addresses global challenges—climate change, biodiversity loss, disaster risk, and sustainable urban development—that transcend national borders. By combining geospatial data and AI, the programme equips students with skills directly aligned with international agendas such as the UN Sustainable Development Goals, the EU Green Deal, and the Sendai Framework for Disaster Risk Reduction.

Internationalisation is also ensured through the use of open global datasets (e.g. Copernicus, crowdsourced data), cloud-based platforms, and collaboration with global research networks such as the European Association of Remote Sensing Laboratories (EARSeL), Copernicus Academy, Ecosystem Services Partnership (ESP) and AI Sweden. The distance-based learning format attracts students from diverse countries and backgrounds. A key strength of the programme is its strong connection to industry and public authorities. Students will work with real-world data and case studies provided by organisations such as national agencies, municipalities, and leading consulting and technology companies. Through project-based courses, guest lectures, and an optional internship, students gain hands-on experience, build professional networks, and often develop ideas for their master theses in collaboration with external partners.

Graduates will therefore be prepared for international careers in government, NGOs, international organisations, and global consultancy and tech firms, contributing to sustainability solutions worldwide.

Programme outcomes

The programme's objectives are in line with the national objectives for master's degrees.

Knowledge and understanding

For a master's degree, the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge in the field and significantly deepened knowledge in certain parts of the field, as well as deepened insight into current research and development work,
- and demonstrate in-depth methodological knowledge in the main field of study.

Skills and abilities

For a Master's degree, the student shall

- demonstrate the ability to critically and systematically integrate knowledge and to analyse, assess and handle complex phenomena, issues and situations, even with limited information
- demonstrate the ability to critically, independently and creatively identify and formulate issues, to plan and use appropriate methods to carry out qualified tasks within given time frames, thereby contributing to the development of knowledge, and to evaluate this work
- demonstrate the ability to clearly present and discuss their conclusions and the knowledge and arguments on which they are based, both orally and in writing, in national and international contexts, in dialogue with different groups, and
- demonstrate the skills required to participate in research and development work or to work independently in other qualified activities.

Judgement and approach

For a Master's degree, the student shall

- demonstrate the ability to make judgements within the main field of study, taking into account relevant scientific, societal and ethical aspects, and demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of science, its role in society and people's responsibility for how it is used, and
- demonstrate the ability to identify their need for further knowledge and to take responsibility for their knowledge development.

Independent work (degree project)

For a Master's degree, the student must, within the framework of the course requirements, have completed an independent project (degree project) of at least 30 higher education credits in the main field of study. The independent project may comprise less than 30 higher education credits, but at least 15 higher education credits, if the student has already completed an independent project at advanced level comprising at least 15 higher education credits within the main field of study or the equivalent from a foreign education.

Programme structure

The programme is designed as a coherent and progressive learning pathway, moving from foundational knowledge in geomatics and artificial intelligence to advanced, independent application in sustainability-oriented contexts.

During the first year, the programme establishes a common and robust foundation for all students, regardless of prior academic background. Core competences are developed in geographic information systems (GIS), remote sensing, and geospatial data management, alongside programming skills with a focus on Python for geospatial applications. Early exposure to GeoAI introduces key concepts such as data pipelines, machine learning methods, and model evaluation. As the year progresses, analytical capabilities are further strengthened through courses in spatial analysis and geostatistics, combined with training in scientific methods and sustainability research. These components are closely linked to societal challenges, including climate change, environmental hazards, and risk assessment. By the end of the first year, students are expected to be able to manage and analyse large geospatial datasets, apply advanced analytical methods, and formulate well-defined, sustainability-oriented research and risk questions.

In the second year, the programme shifts from foundational knowledge to advanced application and specialisation. Building on the first year, students engage with more complex GeoAI approaches, including advanced deep learning techniques and large-scale data processing in cloud-based environments. The learning process becomes increasingly practice-oriented, with a strong emphasis on applying methods to real-world challenges in collaboration with industry partners, public authorities, and research projects. Opportunities for specialisation are provided through elective courses, for example within disaster risk analysis or socio-ecological modelling, as well as through an optional internship. Applied project work plays a central role in this phase, where students work on externally defined problems and develop integrated solutions that combine geospatial data, AI methods, and sustainability perspectives. This progression ensures a transition from guided learning to independent problem-solving in realistic professional settings.

The programme concludes with a 30 ECTS master's thesis, representing the final stage of academic and professional development. The thesis is an independent research or applied project, often conducted in collaboration with external organisations such as companies, government agencies, or municipalities. It enables specialisation within a chosen area of GeoAI and sustainability, while demonstrating the ability to integrate methodological knowledge, technical skills, ethical considerations and critical reflection. Upon completion, graduates are well prepared to work independently in complex analytical environments or to pursue further studies at the doctoral level.

Currently, we have established connections with 16 national and international external partners that co-create the programme and present excellent opportunities for alumns to connect (Aelia Consulting AB; AFRY Infrastructure AB; Aistech Space; Ekologigruppen Ekoplan AB; ESRI Sverige AB; the City of Stockholm Traffic Administration; the Foundation for Sustainable Development (FSD); Geografiska Informationsbyrån i Stockholm AB; Green Urbansights AB; Karlstad Municipality; Lantmäteriet; Metria AB; the Swedish Civil Defense and Resilience Agency (MCF); Total Digital IT Solutions Sweden AB; the Swedish Transport Administration; WSP Sverige AB).

Programme curriculum

The programme contains the following courses:

Compulsory courses (ECTS)

- Principles in GIS (7,5)
- Geospatial Python (7,5)
- Remote Sensing Principles (7,5)
- Introduction to GeoAI (7,5)
- Spatial Analysis and Geostatistics (7,5)
- Geospatial Analysis with Cloud Computing (7,5)
- Methods in Geospatial and Sustainability Research (7,5)
- Environmental Hazards and Impacts (7,5)
- Advanced GeoAI (7,5)
- Applied GeoAI for Sustainable Development (7,5)
- Degree Project in GeoAI for Sustainable Futures (30)

Elective courses (ECTS)

- Geospatial Modelling for Social-Ecological Systems (7,5)
- Disaster Risk Analysis (7,5)
- Internship in GeoAI for Sustainable Futures (7,5)
- Risk Assessment (7,5)

Subject areas are listed here. The courses included in the programme may have different names. Compulsory programme courses can be replaced by elective courses from previous studies.

Title of qualification

Master of Science

Credit transfer

Students have the right to request credit for previous studies at Swedish universities or studies abroad. Decisions on credit transfer are made in accordance with current regulations.

Additional information

Rules for undergraduate and advanced level education at Karlstad University regulate the obligations and rights of students and employees.