Faculty of Science

NGEN21, Geomatics: Applied GIS, 15 credits

Geomatik: Tillämpad GIS, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus is an old version, approved by Study programmes board, Faculty of Science on 2021-05-24 and was valid from 2021-05-24 , autumn semester 2022.

General Information

The course is a compulsory course for a Degree of Master (120 credits) in GIS and remote sensing in the main field of study geomatics and an elective course for a Degree of Master (120 credits) in physical geography and ecosystem sciences.

Main field of studies	*Depth of study relative to the degree requirements*
Physical Geography and Ecosystem Science	A1F, Second cycle, has second-cycle course/s as entry requirements
Geomatics	A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that the student, on completion of the course, should have acquired advanced theoretical knowledge and practical proficiencies about how GIS can be used for applications in earth sciences and related environmental sciences, spatial analysis and decision-making. ArcGIS Pro is the software that mainly is used for exercises and project work. During the course, the student also improve knowledge in GIS programming with Arcpy and Python.

Knowledge and understanding

On completion of the course, the students shall be able to:

- explain different formats and coordinate systems that is used for geographic data
- give an account of different practical application fields for GIS in earth sciences and related environmental sciences

- explain how different GIS methods can be applied on relevant problems and assess which method that is best suited for a given application.

Competence and skills

On completion of the course, the students shall be able to:

- handle geographic data of different types stored in different formats and coordinate systems
- put up semi-automatic batch processes using ArcPy and Python to streamline processing of large data amounts
- use advanced GIS functions in ArcGIS Pro and ArcPy for spatial analysis
- apply advanced analytical methods in GIS to solve realistic environmental problems and support decision making.

Judgement and approach

On completion of the course, the students shall be able to:

- discuss and evaluate the choice of geographic data and relevant GIS methodology to solve different problems that relate to environment and spatial planning
- evaluate and discuss the reliability of different analytical methods in GIS critically.

Course content

The course contains theoretical background for different GIS methods and their application in environment and spatial planning. The theoretical contents of the course includes coordinate system in plan and height, screens and vector calculus, digital terrain models, 3D-city models, spatial interpolation and multi-criteria analysis as decision support. The course focuses especially on the use of advanced functions in ArcGIS Pro and ArcPy for data management and spatial analysis. The course contains extensive exercises with applications of GIS in different fields such as as optimised placement of new schools, risk analysis for landslides, inundation hazard assessment and planning of bike roads. Via these realistic case studies, the student develops the ability and proficiencies to solve relevant problems with different GIS-applications.

Course design

The teaching consists of lectures, computer exercises, group assignments and a more extensive project work. Participation in all components of the course except lectures is compulsory. The lectures communicate theoretical knowledge, and exercises and group assignments connect to the theory through realistic applications. In each practical exercise, the student trains his ability to handle relevant data with advanced GIS methods. For each exercise, the student is required to write a report, that describes how data have been handled and which analytical methods that have been used and present the results in a relevant way, most often in the form of maps. The course is completed with a larger project work that is carried out in groups.

Assessment

Examination is in written form, with a written exam and report submission during the course and through a larger project work at the end of the course.

Students who do not pass an assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To pass the course, approved exam is required, passed project work report and that all compulsory components are passed.

Grades in examination and project work are Failed, Passed, Passed with distinction. Grades on written submissions are Failed, Passed.

The final grade is decided through a joint assessment of the results of the examinating components and the project report in proportion to their extent (see appendix).

Entry requirements

Entry to the course requires general entry requirements, English 6/B and at least 90 credits in natural sciences or technology of which at least 15 credits should be in GIS or the equivalent, such as spatial analysis, cartography, geodesy or remote sensing. Entry to the course also requires NGEN20 Programming for applications in geomatics 15 credits or the equivalent.

Subcourses in NGEN21, Geomatics: Applied GIS

Applies from H22

2204 Exam, 2,5 hp
Grading scale: Fail, Pass
2205 Project work, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
2206 Hand-ins, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction