Faculty of Science

NGEN28, Physical Geography: Collection and Analysis of Geospatial 3D Data, 7.5 credits

Naturgeografi: Insamling och analys av 3D-geodata, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2022-02-14 to be valid from 2022-02-14, autumn semester 2023.

General Information

The course is an elective course at second cycle level for a Degree of Master of Science (120 credits) in GIS and remote sensing and for a Degree of Master of Science (120 credits) in physical geography and ecosystem science, all specialisations.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Geomatics	A1N, Second cycle, has only first-cycle course/s as entry requirements
Physical Geography and Ecosystem Science	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The overarching aim of the course is that the student should acquire knowledge and proficiencies to be able to collect and analyse 3D-geodata. The course contains a theoretical introduction to 3D-geodata with a focus on different application fields. During the course the student develops advanced knowledge about several methods to collect geographic 3D data as for instance GNSS/GPS and laser scanning and methods to extract 3D data from images, e.g. photogrammetry and "structure-from-motion". The course also provides practical skills regarding collection, processing and analysis of 3D-geodata.

Knowledge and understanding

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

- give an account of the basics of 3D-geodata and the need of 3D-geodata in different relevant application fields e.g. physical planning and hydrological modelling
- explain how 3D-geodata can be collected with technologies based on GNSS/GPS, laser scanning, photogrammetry and "structure-from-motion" technologies
- explain differences between different methods for collection of 3D-geodata and describe advantages and disadvantages with different collection methods depending on application
- describe how 3D-geodata can be used for analyses of relevant problems and phenomena.

Competence and skills

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

- demonstrate ability to use different technologies to collect and analyse 3D-geodata
- plan and carry out fieldwork for collection of 3D-geodata
- independently use dedicated software for processing of collected 3D-geodata
- extract objects from point clouds
- carry out analyses with 3D-geodata.

Judgement and approach

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

- provide arguments for which methods for collection of 3D data that are appropriate for different applications
- Critically assess the quality of different types of collected 3D data.

Course content

The course gives a theoretical basis for application of 3D-geodata, e.g. 3D-city models and digital terrain models. The theoretical parts also provide advanced knowledge of different methods for collection of 3D data. Both methods for direct collection of 3D-geodata, GNSS/GPS and laser scanning as methods based on images, photogrammetry and structure-from-motion will be treated. The course contains several practical components. Field work is carried out to collect 3D-geodata with GNSS technology, terrestrial laser scanning and image data with unmanned aerial system (UAS). Exercises in computer lab are carried out to process data to create point clouds, orthophotos and 3D models. The course also contains exercises to analyse collected and processed 3D data.

Course design

The teaching consists of lectures and practical components, both in the form of exercises in the field and exercises in a computer lab. The course also contains study visits and guest lectures that give a broader insight in how 3D data can be used in different subject areas. Exercises, study visits, guest lectures and associated components are compulsory.

Assessment

Examination is in the form of a written exam (5 credits) at the end of the course and through written presentations of exercises and a project assignment (2.5 credits) during the course. Students who do not pass the regular exam will have an additional opportunity to re-sit the exam 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, passed written assignments and passed project report and participation in course's seminars are required. The grading scale for the written exam is Fail, Pass and Pass with distinction, while the grading scale for written assignments and compulsory components is Fail and Pass.

The final grade is decided through the grade on the written examination.

Entry requirements

Admission to the course requires at least 90 credits studies in natural sciences or technology in which at least 15 credits should be in Geographic information science equivalent NGEA11 geographic information systems, basic course, 15 credits. English 6/English B.

Subcourses in NGEN28, Physical Geography: Collection and Analysis of Geospatial 3D Data

Applies from H23

2301 Written exam, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
Written exam
2302 Project work and hand-ins, 2,5 hp
Grading scale: Fail, Pass