



LUND
UNIVERSITY

Faculty of Science

NGEN13, Physical Geography: Programming for Applications in Geomatics, Physical Geography and Ecosystem Science, 15 credits

*Naturgeografi: Programmering för tillämpningar i geomatik,
naturgeografi och ekosystemvetenskap, 15 högskolepoäng*
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2014-12-04 to be valid from 2014-12-04, spring semester 2015.

General Information

The course is included in the programs for Master's degree (120 credits) in geomatics (compulsory course) and physical geography and ecosystem science (elective course). The course is also given as a freestanding course.

Language of instruction: English

Main field of studies

Physical Geography and Ecosystem
Analysis

*Depth of study relative to the degree
requirements*

A1N, Second cycle, has only first-cycle
course/s as entry requirements

Learning outcomes

The aim of the course is to give the student knowledge and skills to handle programming tools that are relevant to solve problems and tasks within the subjects geomatics, physical geography and ecosystem science. The aim is to increase the employability of a graduated student for different relevant professions in public and private sectors and within academic research.

Knowledge and understanding

The student should be able to on completion of the course:

- account for the most common programming languages
- describe the basics of programming and the basic principles of encoding
- explain the importance of programming within different application fields relevant to geomatics, physical geography and ecosystem science

Competence and skills

The student should be able to on completion of the course:

- apply the principles of basic programming in prescribed programming languages
- use a programming language well enough independently to be able to create or join applications
- write own programs based on software libraries, create own applications based on commercial or open source libraries
- troubleshoot and correct in the programming languages that are applied in the course
- document and describe programme code orally and in writing for other versed individuals

Judgement and approach

The student should be able to on completion of the course:

- evaluate and assess prescribed applications
- suggest improvements in existing programme code
- argue for and practically demonstrate the use with programming to solve prescribed problems

Course content

The course contains theoretical basis for programming and application of programming in the fields of geomatics and physical geography and ecosystem science. The course contains a large number of different programming assignments and several projects conducted individually or in groups to solve different relevant problems by means of programmed applications. Apart from the initial programming exercises of basic nature most of the problems are from realistic and relevant applications in research or other activities. Strong emphasis is placed at adaptation and integration of own programs in existing applications to streamline a work process.

Course design

The course is carried out with different types of teaching where lectures and practical exercises dominate. The course is divided into three main modules. Module 1 focuses on basic programming for scientific applications. In this module, techniques for variable handling, input and output of data, logical operations, loops, graphics, matrix and vector handling are included as well as applications for statistics, raster-GIS, numerical methods and simple ecosystem modeling. Module 2 treats object-oriented programming. The applications are taken primarily from analysis of spatial problems with GIS. The course is completed with module 3 that contains a larger assignment that is carried out individually or in groups. The student is given the opportunity to

specialise in applications of one of the programming languages that are included in the course.

Assessment

Examination takes place through assessment of prescribed practical assignments that are presented both orally and in writing. The course also contains a written exam. The course grade is decided by combining the results of the written exam with the results of the assignment in module 3 of the course. A retake is given in close connection to regular examination.

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.

Passing the course requires passed on all compulsory written assignments and the written examination.

Entry requirements

For admission to the course, general entry requirements and Mathematics D are required and at least 90 credits in natural sciences or technology at the basic level of which at least 15 credits GIS, t. NGEA11 or the equivalent.

Further information

The course may not be included in a higher education qualification together with the course GISN24 Python programming in GIS.

Subcourses in NGEN13, Physical Geography: Programming for Applications in Geomatics, Physical Geography and Ecosystem Science

Applies from H21

- 2101 Project work, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 2103 Python exercises, 5,0 hp
Grading scale: Fail, Pass
- 2104 Python exam, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction

Applies from H20

- 2001 Project work, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 2002 Matlab exercises, 3,7 hp
Grading scale: Fail, Pass
- 2003 Python exercises, 3,8 hp
Grading scale: Fail, Pass