



Faculty of Health, Science and Technology  
Geo-Science

# Syllabus

## Geospatial Python

<b>Course Code:</b>	NGAD07
<b>Course Title:</b>	Geospatial Python <i>Geospatial Python</i>
<b>Credits:</b>	7.5
<b>Degree Level:</b>	Master's level
<b>Progressive Specialisation:</b>	Second cycle, has only first-cycle course/s as entry requirements (A1N)

### Major Field of Study:

### Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2023-08-28, and is valid from the Spring semester 2024 at Karlstad University.

### Prerequisites

60 ECTS credits completed in a Science or Technology programme, 7.5 ECTS credits in Programming, and upper secondary level English 6, or equivalent

### Learning Outcomes

Upon completion of the course, students should be able to:

- use the GIS packages available in the programming language Python,
- modify and analyse geometric objects using geospatial Python libraries,
- process spatial data using geospatial libraries,
- carry out spatial and non-spatial analyses of data sets,
- handle coordinate and reference systems,
- apply coordinate transformations,
- apply geocoding of geographical data,
- develop advanced spatial questions,
- create static and interactive maps for visualisation,

- extract and analyse data from OpenStreetMap, and
- use Python script in geospatial open-source software.

## **Content**

This course provides knowledge of Python programming linked to spatial analyses with or without GIS, which makes it possible to automate tasks, create adapted work flows, and solve complex geospatial problems without proprietary software.

The course covers GeoPython concepts for the following uses:

- to create functions for processing geospatial data, from simple to advanced
- to use spatial Python libraries to understand, process, and analyse geometrical elements
- to carry out basic data analysis (read, convert, and extract information)
- to handle and examine spatial data from different sources, for instance local storage, online databases, API services
- to use Python in GIS software in order to adapt and carry out advanced spatial analysis

The programming environment is interactive (Jupyter Notebooks). The Jupyter Lab environment can be used both through open cloud-based websites and local platforms. The course includes lectures on specific topics related to Python programming, combined with exercises related to those topics. Students also complete a project based on the course content.

## **Reading List**

See separate document.

## **Examination**

Assessment is based on individual hand-in assignments and a written project completed in groups and 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**

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