

MNXB07, Data Literacy with Python, 3 credits

Dataanalytiskompetens med Python, 3 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Education Board of Faculty of Science on 2025-02-14. The syllabus comes into effect 2025-02-14 and is valid from the autumn semester 2025.

General information

The course is offered as a standalone course.

Language of instruction: English

*Main field of
study*

Specialisation

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G1N, First cycle, has only upper-secondary level entry requirements

Learning outcomes

The overall aim of the course is to provide the student with fundamental tools for data handling and visualization in Python, as well as to equip the student with essential tools for reproducible data analysis.

Knowledge and understanding

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

- understand different data types and select appropriate visualizations for each of these data types.
- explain three common data formats (wide/long/tidy) and determine whether a given data table conforms to any of these formats.
- describe various methods for aggregating, summarizing and visualizing data.
- predict the effects of different types of joins (inner/outer/full) on the resulting data table.

- identify key criteria for reproducibility in data analysis and understand the concept of virtual environments in Python.

Competence and skills

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

- set up a reproducible project environment with specified dependencies and initiate a data analysis project.
- create various types of diagrams, tables and visualizations that appropriately represent data based on its type and the research question
- use Python to perform data transformations and cleaning of data sets
- apply different types of joins to merge two data tables.
- conduct a simple data analysis in Python using data from multiple sources
- document a data analysis in Python using a notebook.

Judgement and approach

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

- formulate questions that can be answered through exploratory data analysis.
- interpret graphs and data visualizations.
- reflect on the conclusions drawn from data.
- evaluate data quality in terms of missing values and consistency in data coding.
- perform a critical review of a data analysis conducted by another student.
- assess the reproducibility of a data analysis.

Course content

The course provides the student with fundamental skills in data handling using Python. The focus is on exploratory data analysis, leveraging visualizations and data summaries to extract insights from datasets. Additionally, the course covers data cleaning, transformations, and merging data from multiple sources.

These competences are developed through the hands-on development of data analysis scripts in an interactive environment. The course emphasizes literate programming, which teaches the student about reproducibility and highlights the importance of well-documented data analysis that can be shared with others.

At the end of the course, the student develop a deeper understanding of virtual environments in Python and the concept of reproducibility. This enhances the reliability of conclusions drawn from data analysis.

Course design

The teaching includes recorded lectures, supervised programming sessions and project work. Active participation in at least half of the sessions is mandatory. Students must also complete a final project, in which they create a reproducible analysis report based on a provided data set, and perform a critical review of others students' analyses.

Assessment

The examination is done in the form of submitting a final assignment, including a project report that undergoes peer review before being assessed, as well as active participation in at least half of the programming sessions.

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.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction

To pass the course, the student must receive a passing grade on the project report, as well as completed peer review.

Grading scale on the project report includes the grades: Fail, Pass, Pass with distinction. The grade on the project report gives the final course grade.

Entry requirements

General requirements and studies equivalent of course English 6 from Swedish Upper Secondary School.

Further information

The course is given by the Centre of Mathematical Sciences, Lund University.