UNIVERSITY OF BORÅS

Data Visualization
Datavisualisering
7.5 credits

Ladok Code: C1VIIB
Version: 1.0
Established by: Committee for Education in Librarianship, Information, and IT 2025-05-13
Valid from: Autumn 2025

Education Cycle: First cycle
Main Field of Study (Progressive Specialisation): Computer Science (G1F), Informatics (G1F)
Disciplinary Domain: Natural sciences
Prerequisites: General entry requirements for university studies, and completed courses in Programming 7.5 credits and Relational Database 7.5 credits, or equivalent.
Subject Area: Informatics/Computer and Systems Sciences
Grading Scale: Seven-degree grading scale (A-F)

Content
The course introduces the design and implementation of applications for interactive visualization of data and information using common techniques within computer graphics. The Python programming language is introduced and used for applied data visualization in the course.

Fundamental and central concepts within data visualization are covered, applied to data analysis. Multiple visualization techniques are studied for space, geographic space, time series, and multivariate data, including data structured as trees, graphs and networks. Concepts in graphic design are introduced, such as the utilization of graphical objects and structures with the intricacies of human perception in mind. Practical experience is obtained as the students develop interactive, graphical applications for visualizing data, using common visualization libraries.

The course also covers the CRoss-Industry Standard Process for Data Mining (CRISP-DM).

Learning Outcomes
After completing the course, the student will be able to:

Knowledge and understanding
1.1 describe syntax and semantics, including common concepts and idioms, for the Python programming language,
1.2 describe fundamental techniques and principles for graphic design with respect to human perception,
1.3 describe fundamental theory, constraints and possibilities for visualizing data,
1.4 describe common techniques for visualizing space, geographic space, time series, and multivariate data,
1.5 describe common techniques for visualizing data structured as trees, graphs, and networks,
1.6 describe a standard process for data mining (CRISP-DM),

Competence and skills
2.1 implement simple Python programs for preprocessing and managing data,
2.2 construct interactive and graphical applications for visualizing data,
2.3 utilize common frameworks and libraries for visualizing data,
2.4 utilize standard techniques for preprocessing data,
2.5 utilize a standard process for data mining (CRISP-DM),

Judgement and approach
3.1 select relevant techniques and methods for visualizing specific dataset and problems and
3.2 select and apply methods for preprocessing datasets for subsequent data analysis.

Forms of Teaching

Instruction in the course consists of:
· lectures
· tutoring in the form of workshops
· tutoring of an assignments and a project
· seminars

The language of instruction is English.

Forms of Examination

The course will be examined through the following examination elements:

Exam: Individual written exam
Learning outcomes: 1.1 – 1.6, 2.3 – 2.4, 3.1 – 3.2
Credits: 3
Gradingscale: Seven-degree grading scale (A-F)

Laboration: Data visualisation with the help of software libraries (group assignment)
Learning outcomes: 2.1 – 2.4, 3.1
Credits: 1.5
Gradingscale: Fail (U) or Pass (G)

Project: Visualisation of a dataset for enhanced understanding and exploration (group assignment)
Learning outcomes: 2.1 – 2.5, 3.1 – 3.2
Credits: 2.5
Gradingscale: Fail (U) or Pass (G)

Seminar: Presentation of performed project for visualisation of a dataset for enhanced understanding and exploration
Learning outcomes: 2.1 – 2.5, 3.1 – 3.2
Credits: 0.5
Gradingscale: Fail (U) or Pass (G)

For a passing grade (A-E) on the entire course, the grade E at a minimum is required on the Individual written examination and Pass (G) on the other examination components. A higher grade on the whole course is then determined by the grade on the Individual written exam.

If the student has received a decision/recommendation regarding special pedagogical support from the University of Borås due to disability or special needs, the examiner has the right to make accommodations when it comes to examination. The examiner must, based on the objectives of the course syllabus, determine whether the examination can be adapted in accordance with the decision/recommendation.

Student rights and obligations at examination are in accordance with guidelines and rules for
the University of Borås.

Literature and Other Teaching Materials

The course literature is in English.

Dabbas, E. (2021 eller senare) Interactive Dashboards and Data Apps with Plotly and Dash. Packt Publishing.

Wilke, C.O. (2019 or later edition). Fundamentals of Data Visualization. O'Reilly.

Scientific articles and other material may be added according to the teacher's instructions.

Student Influence and Evaluation

The course is evaluated in accordance with current guidelines for course evaluations at the University of Borås in which students' views are to be gathered. The course evaluation report is published and returned to participating and prospective students in accordance with the above-mentioned guidelines, and will be taken into consideration in the future development of courses and education programmes. Course coordinators are responsible for ensuring that the evaluations are conducted as described above.

Miscellaneous

The course is given as a freestanding course.

This syllabus is a translation from the Swedish original.