Course: Data Science 4 — credits: 5

Course code	BFVM23DATASCNC4
Name	Data Science 4
Study year	2025-2026
ECTS credits	5
Language	English
Coordinator	-
Modes of delivery	Assignment Lecture
Assessments	Graph Theory - Computer, organised by STAD examinations Multivariate Analysis - Assignment

Learning outcomes

1. You can design a graph or multivariate model to represent a dataset within the life sciences domain and defend their choice based on the relational nature of the data.
1. You can choose appropriate existing algorithms to answer questions in the life sciences domain and justify this choice.
1. You can develop working code for an existing algorithm, given the relevant pseudocode and supporting libraries, such as NumPy and NetworkX.
1. You can interpret and explain mathematical set builder notation in the context of graph theory.
1. You can calculate complex attributes of abstract graphs, for example, the radius of a path graph of size n.
1. You can interpret the results from multivariate models in terms of relations within and between coupled datasets.
1. You can interpret the results from multivariate models in the context of the life sciences domain.

Content

This course introduces you to **relational models of data**, with a focus on graphs and multilinear models. The course begins with an overview of **graph theory**, including the concepts of graphs, trees, adjacency matrix, directed acyclic graphs, paths and cycles, tree search, shortest path, random walks, Markov chains, sorting, and algorithmic complexity. The course then delves into the analysis of complex datasets using **multivariate linear models**, including multiple linear regression, partial least squares, canonical correlations, singular value decomposition, and principal component analysis.
Throughout the course, you will learn various methods for investigating and assessing relational features and complex datasets using graphs and multilinear models, with applications to the life sciences. You will also gain practical experience through programming assignments and data analysis projects.

Included in programme(s)

Master Data Sciences for the Life Science

School(s)

Institute for Life Science & Technology

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