



# SF2956 Topological Data Analysis 7.5 credits

Topologisk dataanalys

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Mathematics

## Specific prerequisites

- English B / English 6
- Completed basic course in numerical analysis (SF1544, SF1545 or equivalent)
- Completed basic course in probability theory and statistics (SF1922, SF1914 or equivalent)

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After completing the course, the student shall be able to

- use concepts, propositions and methods to solve, and present the solution of problems within topological data analysis;
- use available software to analyze geometric data.

## Course contents

The course contains the following topics:

- Kleinberg theorem about impossibility of clustering,
- metric spaces and dendrograms,
- classical hierarchical clustering schemes (single, complete, average, and Hausdorff linkage),
- elements of simplicial complexes,
- transforming data into simplicial complexes via Chech and Vietoris-Rips constructions
- extracting homology out of data based simplicial complexes
- persistence modules, barcoding, and feature visualization

## Examination

- PRO1 - Project, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.