# Visualization

Visualisering
6 credits

Programme course

732A98

Valid from: 2016 Autumn semester

| **Determined by** | **Main field of study** | |
|---|---|---|
| The Quality Board at the Faculty of Arts and Sciences | Statistics | |
| **Date determined** | **Course level** | **Progressive specialisation** |
| 2016-04-13 | Second cycle | A1N |
| **Revised by** | **Disciplinary domain** | |
| | Technology | |
| **Revision date** | **Subject group** | |
| | Statistics | |
| **Offered first time** | **Offered for the last time** | |
| Autumn semester 2016 | | |
| **Department** | **Replaced by** | |
| Institutionen för datavetenskap | | |

# Course offered for

- Master's Programme in Statistics and Machine Learning

# Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen of 180 ECTS credits in one of the following subjects:
    - statistics
    - mathematics
    - applied mathematics
    - computer science
    - engineering
- Passed courses in
    - calculus
    - linear algebra
    - statistics
    - programming
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6)
  Exemption from Swedish

# Intended learning outcomes

After completion of the course the student should be able to:

- describe major principles for data visualization using static , interactive or dynamic graphs,
- select suitable static, interactive or dynamic visualization techniques for common problems in data visualization,
- produce simple graphs used for analysis and high-quality graphs used for publications,
- use up-to-date open-source and commercial visualization tools to describe the structure of a large and complex data sets, and also discover the hidden patterns and trends in the data,
- show knowledge of visualization methods present in recent research publications.

# Course content

The course comprises:

- principles of correct data visualization and misleading graphs,
- static tools used for visualizing univariate and bivariate data sets: histograms, bar charts, scatter plots, time series plots,
- visualizing of textual information: word trees and word clouds,
- static tools used for multidimensional data: scatter plot matrices, treemaps, heatmaps, bubble plots, Chernoff faces, star charts, parallel coordinate plots,
- visualization by means of multidimenstional scaling,
- visualizing geographical information by using web applications and standalone software,
- creating animation by combining static graphs,
- animated bubble plots,
- interactive visualization tools: linked graphs, brushing, identification and guided tours,
- producing publication- and presentation-quality graphics from simple graphs.

# Teaching and working methods

The teaching comprises lectures, seminars, and computer exercises complemented by self-studies. Lectures are devoted to presentations of theories, concepts and methods. Computer exercises provide practical experience of data visualization. The seminars comprise student presentations, discussions of the computer assignments and presentation of research papers related to visualization.
Language of instruction:
English.

# Examination

Written reports on computer exercises. Active participation in the seminars. Presentation of a research article. One final written or oral examination. Detailed information about the examination can be found in the course's study guide.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it.

If the coordinator has recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

# Grades

ECTS, EC

# Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.

### About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly, or as a whole, in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.