



## Course syllabus

Faculty of Technology

Department of Computer Science and Media Technology

4DT911 Projekt i visualisering och dataanalys, 10 högskolepoäng

Project In Visualization and Data Analysis, 10 credits

### **Main field of study**

Computer Engineering

### **Subject**

Informatics/Computer and Systems Sciences

### **Level**

Second cycle

### **Progression**

A1F

### **Date of Ratification**

Approved 2024-01-15.

The course syllabus is valid from autumn semester 2024.

### **Prerequisites**

90 credits in Computer Science (including a degree project at Bachelor level).

10 hp project course on advanced level (e.g. 4DV651, 4DV652 or equivalent).

English 6 or the equivalent.

## Objectives

After completing the course the student shall be able to:

*Knowledge and understanding*

- A.1 Explain and motivate information visualization and visual analytics from a human-computer perspective as well as how these areas facilitate data analysis, and
- A.2 identify characteristics of state-of-the-art Visual Analytics (VA) systems.

*Skills and abilities*

- B.1 Independently organize and carry out an agile project,
- B.2 independently learn to use tools, methods, and software libraries used within information visualization and visual analytics,
- B.3 identify analytical requirements/tasks and based on these decide which visualizations, data analyses, and interaction methods are most suitable (design goals and choices),
- B.4 implement a visual analytics system using reasonable technical solutions and deploy this, and
- B.5 based on the design goals define and perform evaluations of a visual analytics system.

#### *Judgement and approach*

- C.1 Reflect on which types of questions and analysis processes are best supported by different combinations of visualization techniques and data-analysis algorithms,
- C.2 reflect on how the choice of visualizations is affected by the groups of people that will use the system with respect to, e.g., used metaphors and common understanding,
- C.3 reflect on the bias that exists in the system based on collected data, data processing, analysis methods, and visualization techniques.

## Content

The course is a project course with a focus on Visual Analytics (VA) with a given analytical problem and setting. The students are expected to work using agile processes in teams and to perform all roles except product owner. As knowledge on agile software development is a prerequisite, the students are expected to independently manage their own agile project.

Visual analytics systems bring data analysis closer to end-users by effectively combining interactive visualization and complex algorithms, guided by the underlying analytical processes inherent to the data and the application at hand. The students will be introduced to visual analytics theoretical aspects and tools, create the conceptual design of the VA project, implement their designs, and present their results. In more detail, this VA project course covers the following aspects:

- The importance of data and visualization for answering analytical questions.
- Selected examples of state-of-the-art VA systems.
- Information visualization and visual analytics in realistic projects.
- Data analysis and processing in realistic projects.
- Tools, services, and software libraries that can be used for data analysis and to develop information visualizations, e.g., D3, yFiles, and Bokeh.
- Challenges and opportunities at the interfaces between the human analyst, computational models, and visual display.
- How visualizations are evaluated in realistic projects.
- Types of bias in data, analysis, and visualization.

## Type of Instruction

The instruction consists of lectures and supervision meetings. The lectures present the project as well as the tools, methods, and resources that the students are expected to use. The students will have regular supervision meetings with a teacher during the project. All projects are presented at a seminar at the end of the course.

## Examination

The course is assessed with the grades A, B, C, D, E or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Assessment of student performance is made through a group project, reports in group and an individual reflection report.

To pass the course, grade E or higher is required for all parts. The final grade is decided from: Vision and planning documents (20%), Project work (incl. deliverables) (50%), Reflection report - How to manage an agile project (10%), Reflection report - Human-centered aspects of VA (10%), and Design, implementation, and result (10%).

Resit examination is offered in accordance with Linnaeus University's Local regulations for courses and examination at the first- and second-cycle levels. In the event that a student with a disability is entitled to special study support, the examiner will decide on adapted or alternative examination arrangements.

## Objectives achievement

The examination of the course is divided as follows:

Module 2401 Vision and planning documents 2.0 credits with the grading system AF  
Module 2402 Project work (incl. deliverables) 5.0 credits with the grading system AF  
Module 2403 Reflection report - How to manage an agile project 1.0 credits with the grading system AF  
Module 2404 Reflection report - Human-centered aspects of VA 1.0 credits with the grading system AF  
Module 2405 Design, implementation, and result 1.0 credits with the grading system AF

The examination elements are linked to the course objectives in the following ways:

Module 2401 links to the course objectives: A.1, A.2, B.1, B.2, B.3  
Module 2402 links to the course objectives: A.1, A.2, B.1, B.2, B.3, B.4, B.5, C.3, C.4  
Module 2403 links to the course objectives: B.1  
Module 2404 links to the course objectives: A.1, A.2, B.3, B.5, C.1, C.2, C.3, C.4  
Module 2405 links to the course objectives: A.1, A.2, B.1, B.2, B.3, B.5, C.1, C.3, C.4

## Course Evaluation

A course evaluation should be conducted during the course or in connection with its conclusion. The results and analysis of the completed course evaluation should be promptly communicated to students who have completed the course. Students participating in the next course instance should be informed of the results of the previous course evaluation and any improvements that have been made, no later than at the start of the course.

## Overlap

The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course:  
4DV807, 10 credits

## Other Information

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest. The course is conducted in such a way that the course participants' experiences and knowledge are made visible and developed. This means, for example, that we have an inclusive approach and strive for no one to feel excluded. This can be expressed in different ways in a course, for example by using the gender neutral example.

## Required Reading and Additional Study Material

The students are expected to find suitable literature on their own. The list below can be used as a starting point.

- Keim, Daniel, Kohlhammer, Jörg, Ellis, Geoffrey, and Mansmann, Florian, *Mastering the Information Age: Solving Problems with Visual Analytics*, Eurographics, latest edition.
- Munzner, Tamara, *Visualization Analysis and Design*, CRC Press, latest edition.
- Purchase, Helen C., *Experimental Human-Computer Interaction: A Practical Guide with Visual Examples*, Cambridge University Press, latest edition.