Linnæus University

Course syllabus

Faculty of Technology
Department of Computer Science and Media Technology

4DV807 Projekt i visualisering och dataanalys, 10 högskolepoäng
Project In Visualization and Data Analysis, 10 credits

Main field of study
Computer Science

Subject Group
Informatics/Computer and Systems Sciences

Level of classification
Second Level

Progression
A1F

Date of Ratification
Approved by Faculty of Technology 2019-10-28
The course syllabus is valid from autumn semester 2020

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 B/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.

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 examination of the course is divided as following:

Code	Appellation	Grade	Credits
2001	Vision and planning documents	AF	2.00
2002	Project work (incl. deliverables)	AF	5.00
2003	Reflection report - How to manage an agile project	AF	1.00
2004	Reflection report - Human-centered aspects of VA	AF	1.00

2005	Design, implementation, and result	AF	1.00

The course is assessed with the grades A, B, C, D, E, Fx 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 programming project, an oral presentation, and an oral exam. Repeat examination is offered in accordance with Local regulations for courses and examination at the first- and second-cycle level at Linnaeus University.

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%).

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customized exam or to have the student conduct the exam in an alternative way.

Objectives achievement

The examination parts are linked to the learning outcomes as follows:

Goal	2001	2002	2003	2004	2005
A.1	✓	✓		✓	✓
A.2	✓	✓		✓	✓
B.1	✓	✓	✓		✓
B.2	✓	✓			✓
B.3	✓	✓		✓	✓
B.4		✓			
B.5		✓		✓	✓
C.1				✓	✓
C.2				✓	
C.3		✓		✓	✓

Course Evaluation
During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Other
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.