



## Course syllabus

Faculty of Technology

Department of Computer Science and Media Technology

4DV652 Projekt i dataintensiva system, 10 högskolepoäng

Project in Data Intensive Systems, 10 credits

### Main field of study

Computer Science

### Subject Group

Informatics/Computer and Systems Sciences

### Level of classification

Second Level

### Progression

A1N

### Date of Ratification

Approved by Faculty of Technology 2019-04-24

The course syllabus is valid from spring semester 2020

### Prerequisites

NO VALUE DEFINED

## Objectives

After completing the course the student shall be able to:

- Characterize the role of machine learning in a software system and how it can be integrated in the structure of such systems,
- enumerate which properties a tool or software library should have to be applied to a given problem,
- name and explain the most common problems when attempting to use unprocessed data in machine learning,
- independently learn different tools, methods, and software libraries used within machine learning,
- elicit requirements from a customer and based on these determine which data is needed and which machine learning techniques that is most suitable,
- from a set of customer requirements define metrics that can be used to evaluate how well a machine learning model performs,
- implement and evaluate a system with a machine learning component,
- prioritize functionality and continuously release new functionality to customers,
- ensure that the system is operational,
- critically reflect on the result of a project and how well it fulfills the customer requirements with respect to, e.g., technology used, architecture (software and hardware), data, metrics, etc, and
- critically reflect on how agile and Lean were used throughout the project with respect to, e.g., work environment.

## Content

The course is a project course that, given a realistic problem and settings, considers the entire CDIO (Conceive-Design-Implement-Operate) cycle. The students are placed in the role of a small development team within an agile startup that should develop a data-driven product.

The students are expected to work using agile processes in teams of 5-7 and are expected to perform all roles except product owner. The startup environment requires fast releases and effective use of available resources focus is put on Lean agile as well as applied machine learning and data processing.

- How machine learning projects are structured and implemented.
- Tools, services, and libraries that are used for data analysis and machine learning, e.g., Weka and Tensorflow.
- The configuration of pipelines for machine learning systems with respect to software and hardware, e.g., accelerators.
- The practice of working with real data with respect to, e.g., collection, processing, and analysis.
- Evaluation of performance based on customer requirements.
- Experiment-driven development with short design, training, and evaluation cycles.
- The Lean strategy for production and the Toyota production system.
- How Lean-Agile combines the ideas from Lean with agile processes.
- What is waste in software development and how can it be reduced?
- How can just-in-time-production be applied to software development?
- How can a team learn, for example from reflection after a spring and how can the process highlight the development team (and their competences).
- Software as something complete.
- Advanced skills in writing reflection reports.

## 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. T

All projects will be presented at a seminar at the end of the course.

## Examination

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 a fail (i.e. received the grade F). Assessment of student performance is made through theoretical assignments, programming assignments, and a written exam. Students who do not pass the regular examination will be offered retrials close to the regular examination.

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 - Choices and outcomes (10%), Reflection report - Lean (10%), and Design, implementation, and result (10%).

Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.

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 customised exam or to have the student conduct the exam in an alternative way.

## 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



Course evaluation is to be carried out before the end of the course evaluation is 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.

- Gollapudi, Sunila, *Practical Machine Learning*. PACKT publishing, 2016, ISBN: 178439968X.