UNIVERSITY OF GOTHENBURG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT824 Software Engineering for Data-Intensive AI Applications, 15 credits

Software engineering för dataintensiva AI-applikationer, 15 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2019-02-07 to be valid from 2019-09-02, autumn semester of 2019.

Field of education: Science 100%
Department: Department of Computer Science and Engineering

Position in the educational system

The course is offered within the N1SOF Software Engineering and Management Bachelor's Programme.

The course can be part of the following programme: 1) Software Engineering and Management Bachelor's Programme (N1SOF)

Main field of studies	*Specialization*
Software Engineering	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

To be eligible for this course, students must have successfully completed DIT821 Software Engineering for AI Systems, 7.5 credits, or equivalent.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- explain how data analytics and business intelligence have become driving forces for value creation in enterprises
- exemplify problems in releasing and deploying software systems that rely on AI techniques
- evaluate the suitability of different AI techniques based on defined data analysis goals

Competence and skills

- select and implement suitable AI techniques for an open and realistic problem
- apply enterprise-grade AI frameworks and apply them in a realistic context
- apply data analytics and business intelligence software patterns and architectures depending on requirements
- create and apply a validation and deployment strategy for a data-intensive AI system

Judgement and approach

- judge which patterns and architectures work best for given data processing requirements and how they can be implemented with the available frameworks
- design a visualisation and reporting interface for the system that allows non-experts to use the outcome of the AI technique in a meaningful way

Course content

This project course addresses issues relevant for software engineering for systems that use artificial intelligence (AI) techniques such as machine learning or large-scale parallel data processing. This includes a discussion of the value that can be created through the use of AI, in particular for data analytics and business intelligence, as well as its ethical considerations. At the same time, technological and architectural foundations of software systems using AI techniques and handling large amount of data are discussed. The course addresses how software systems need to be structured and deployed in order to be able to achieve the performance required for realistic applications. The selection and implementation of different AI techniques based on requirements of a specific realistic problem are discussed. Relevant software architectures and patterns are introduced and discussed in the context of a realistic application scenario.

A main focus is high-data throughput systems that incorporate complex business logic and business processes and work on large data sets, possibly with a continuous stream of data that needs to be processed. Such systems are very common in the industry and students are very likely to come in contact with the principles covered in this course in their early professional career. Students will create a running software that uses state-of-the-art architectures and AI techniques to design and build a system based on realistic specifications and requirements.

Sub-courses

1. **Written exam** *(Tentamen),* 7.5 credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
2. **Project** *(Projekt),* 7.5 credits
   Grading scale: Pass (G) and Fail (U)

Form of teaching

The teaching consists of lectures, workshops, and a project, as well as supervision in connection to the project.

Language of instruction: English

Assessment

The course is examined through a review of the artifacts the students produced for their projects, a written group report, and individual written examination carried out in an examination hall.

Furthermore, in order to assure individual grading, each student is required to traceably (i.e. with visible support that is possible to grade) show and argue for their:

• artifact contributions to the project and subgroup they were a member of,
• role in the project group,
• fulfillment of responsibilities for this role in terms of artifacts and activities,
• interaction and knowledge transfer activities with others, and
• how this contributed to the project as a whole.

In case a student fully participated in the project work, but failed the project in a few elements, one individual re-examination is provided. In case the student did not contribute to the project work, or failed the re-examination, the student has to join a new project group.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
A Pass grade (G) for the entire course requires at least a Pass grade for all sub-courses. To be awarded Pass with Distinction (VG) for a full course, the student must, in addition, receive a VG on the sub-course written exam.

The grade G reflects fulfillment of learning outcomes for simple systems and highly structured problems, while VG reflects fulfillment of learning outcomes also for complex systems and unstructured problems. For VG the student has to demonstrate the ability to apply all theories, methods, techniques and relate the applications to the problems discussed in the course.

Course evaluation

The course is evaluated through meeting after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

Course literature to be announced the latest 8 weeks prior to the start of the course.