DIT374   Python for Data Scientists, 7.5 credits

Python för datavetare, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2020-01-21 and was last revised on 2020-01-21 to be valid from 2020-08-31, autumn semester of 2020.

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

Position in the educational system

The course can be part of the following programme: 1) Applied Data Science Master's Programme (N2ADS)

Main field of studies	*Specialization*
Data Science	A1N, Second cycle, has only first-cycle course/s as entry requirements
Computer Science	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

To be eligible in the course, the student needs a bachelor degree. Furthermore, the student needs 7.5 hec programming.

Applicants must prove knowledge of English: English 6/English B or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

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

The course is a combination of a continuation course in programming, object oriented programming, data structures, foremost from the perspective of data science, including a short orientation about algorithms and algorithm design principles. The language in this course is Python which is the most common language in the area of data science. The course provides a good foundation for further studies in the area of data science.

Knowledge and understanding
- explain the basics about classes and objects;
- explain some basic abstract data types and data structures, including lists, queues, hash tables, trees and graphs;
- explain some of the algorithms used to manipulate and query these data structures in an efficient way, for example for sorting and searching, and being able to use the respective standard libraries in Python.

Competence and skills
- make efficient use of predefined data structures in Python;
- construct simple programs using classes and objects;
- use a standard library of data structures and algorithms in Python for solving tasks within the area of data science.

Judgement and approach
- compare and value different aspects of program structures;
- analyse the efficiency of different algorithms, for example searching and sorting algorithms;
- make informed choices between different data structures and algorithms for different applications, in particular those relevant for data science.

Course content
The course covers the following topics:

- basic data types in Python,
- basic constructs of programming language such as expressions and control structures,
- Object oriented design in Python and basic object oriented programming including examples from the area of data science,
- common data structures such as arrays, lists, and hash tables,
- stacks, queues, priority queues, maps, sets, tees and graphs,
- standard algorithms for these data structures, including their resource demands,
- searching and sorting,
- asymptotic efficiency and simple complexity analysi,

- standard libraries for data structures and algorithms, in particular those that are relvant from a data science perspective,
- an orientation about algorithms and algorithm design principles

Sub-courses

1. **Assignments** *(Inlämningsuppgifter),* 7.5 credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)

Form of teaching
Lectures and programming assignments

Language of instruction: English

Assessment
Compulsory programming assignments (both indivudal assignments and assignments done in groups).

If a student, who has failed the same examined element on two occasions, wishes to change examiner before the next examination session, such a request is to be submitted to the department in writing and granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In the event that a course has ceased or undergone major changes, students are to be guaranteed at least three examination sessions (including the ordinary examination session) over a period of at least one year, though at most two years after the course has ceased/been changed. The same applies to work experience and VFU, although this is restricted to just one additional examination session.

Grades
The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
A passing grade for the entire course requires at least a passing grade for all assignments, both the assignments that are graded as pass/fail and those that that graded as VG/G/U. To be awarded a higer passing grade for a full course, the student must, in addition, have a higher average on the weighted grades from the subset of assignments that were graded with the full grade scale.

Course evaluation

The course is evaluated through meetings both during and 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.

The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

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

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