

# Syllabus

for course at advanced level

**Programming for Data Science**  
**Programmering för data science**

**7.5 Higher Education**  
**Credits**  
**7.5 ECTS credits**

<b>Course code:</b>	ML437N
<b>Valid from:</b>	Spring 2020
<b>Date of approval:</b>	2019-11-12
<b>Department</b>	Department of Computer and Systems Sciences
<b>Main field:</b>	Computer and Systems Sciences
<b>Specialisation:</b>	A1N - Second cycle, has only first-cycle course/s as entry requirements

## Decision

This syllabus was approved by the Head of the Department 2019-11-12.

## Prerequisites and special admittance requirements

90 ECTS in Computer and Systems Sciences (or equivalent knowledge) or admission to the Master's programme in Decision Analysis and Data Science (SBDSO).  
English 6 (or equivalent knowledge).

## Course structure

Examination code	Name	Higher Education Credits
PDSH	Programming for Data Science, take home exam	4
PDSI	Programming for Data Science, assignments	3.5

## Course content

The course will start by introducing syntax and semantics of programming languages, which are suitable for programming machine learning and data science solutions.

Subsequently, methods, routines and libraries for importing data of different types and formats will be introduced, together with exploration and visualization of data.

The course will continue with the presentation of unsupervised and supervised learning algorithms, such as decision trees, naive Bayes classification, k nearest neighbour classification, and k-means clustering.

Finally, evaluation methods for performance assessment will be presented.

## Learning outcomes

Upon successful completion of the course, the student should be able to:

- describe, implement and apply methods and techniques for converting data to a suitable format for data analysis
- reason about processes and algorithms for data exploration and data analysis
- implement and apply algorithms for supervised and unsupervised data science
- account for, implement and apply methods and techniques for evaluation of data science results and data analysis results.

## Education

The teaching activities consist of:

- recorded lectures
- recorded lessons
- supervision sessions

The teaching activities are distance-based and take place online.

### **Forms of examination**

- a. The course is examined through home exam and assignments.
- b. The final grading of the course is based on the following grading scale related to the learning outcomes of the course: A = Excellent, B = Very Good, C = Good, D = Satisfactory, E = Sufficient, Fx = Fail, F = Fail.
- c. The grading criteria are communicated to the students at the start of the course.
- d. In order to complete the whole course segment the student must obtain at least grade E (or P with Pass/Fail grades) in all course components/examinations.
- e. In addition the following regulations also apply:
  - Students who obtain grade Fx in a written examination task are allowed to complete a supplementary assignment in order to elevate the grade to E.  
The examiner informs the concerned students when the results of the written examination are published. The supplementary assignment has to be submitted within a given deadline and can only be utilized to elevate the grade of the actual examination task.
  - Students who obtained grade E in an examination task are not allowed to re-write the examination or resubmit the assignment in order to obtain a higher grade.
  - Students who have failed the same examination task twice are allowed to have another examiner appointed, unless there are special reasons to the contrary.

### **Interim**

When a course is discontinued, or its contents are substantially altered, the following applies:

- Failed examination tasks are replaced with other similar examination tasks according to a specific plan.
- If no similar examination tasks can be provided, at least three examination opportunities per examination task should be offered during a period of at least three terms from the date of the decision. After this period, no examinations should be carried out on the course.

### **Limitations**

This course may not be included in a degree together with a course, taken in Sweden or elsewhere, of identical or partially similar content.

### **Required reading**

Information about course literature is available on the department's website - [www.dsv.su.se](http://www.dsv.su.se) - at least two months before the start of the course.