



## COURSE SYLLABUS

### **Data Science, 7.5 credits**

*Data Science, 7,5 högskolepoäng*

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<b>Course Code:</b> TDSR22	<b>Education Cycle:</b> Second-cycle level
<b>Confirmed by:</b> Dean Mar 1, 2022	<b>Disciplinary domain:</b> Technology
<b>Revised by:</b> Director of Education Oct 25, 2023	<b>Subject group:</b> DT1
<b>Valid From:</b> Aug 1, 2024	<b>Specialised in:</b> A1N
<b>Version:</b> 2	<b>Main field of study:</b> Computer Science

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### **Intended Learning Outcomes (ILO)**

After a successful course, the student shall

Knowledge and understanding

- display knowledge of the phases in a data analysis project
- display knowledge of the fundamental tasks in data analysis
- show familiarity with key research directions in data analysis and machine learning

Skills and abilities

- demonstrate the ability to identify situations or tasks for which data analysis can support business or technical decision-making.
- demonstrate the ability to identify and apply a suitable technique based on a problem description
- demonstrate the ability to collect, select and preprocess data in order to prepare it for data analysis
- demonstrate the ability to use a software tool for all parts of a data analysis project
- demonstrate the ability to analyse results and models from a data analysis project

Judgement and approach

- demonstrate an understanding of how data analysis can be used as a tool to support business and technical decision-making

### **Contents**

The exponential growth of the digital universe, particularly in the form of storage and computing power in recent decades, enables companies to accumulate huge amounts of data at moderate cost. Accompanying this technological shift is a widespread realization that collected data contain potentially valuable information. Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from data in various forms, both structured and unstructured, through data analysis.

The course includes the following elements:

- Organization of a data analysis project and its different phases, i.e., business understanding, data understanding, preprocessing, modelling, evaluation and deployment
- Understanding and preparing data for analysis
- Fundamental tasks in data analysis, i.e., classification, regression, clustering, association analysis and deviation analysis
- Software tools for data analytics
- Basic machine learning techniques for finding patterns, explanations and predictions
- Data analytics applied in different engineering and business domains

### Type of instruction

The course consists of lectures, exercises, assignment and project with tutoring.

The teaching is conducted in English.

### Prerequisites

The applicant must hold the minimum of a bachelor's degree (i.e. the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in Computer Engineering, Computer Science or Electrical Engineering (with relevant courses in computer engineering), or equivalent, or passed courses at least 150 credits from the programme Computer Science and Engineering. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

### Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Examination <sup>†</sup>	2.5 credits	5/4/3/U
Assignments	1.5 credits	U/G
Project	3.5 credits	U/G

<sup>†</sup> Determines the final grade of the course, which is issued only when all course units have been passed.

### Course literature

The literature list for the course will be provided 8 weeks before the course starts.

Principal text:

Title: Guide to Intelligent Data Science

Author(s): Berthold, Borgelt, Höppner, Klawonn, & Silipo (2020)

Publisher: Springer

ISBN: 978-3-030-45573-6 (available online through library services)

Additional texts:

3-5 additional research articles and technical reports