Programme Syllabus

Data Science: Master programme 120 Credits*

Data Science: Masterprogram 120 högskolepoäng

1. Objectives of the Educational Programme

1.1 Objectives, as Specified in the Higher Education Act (1992:1434), Chapter 1, section 9:
Second level education shall essentially build on the knowledge that students acquire in first level education or corresponding knowledge. Second level education shall involve a deepening of knowledge, skills and abilities relative to first level education and, in addition to what applies to first level education, shall

- further develop the students' ability to independently integrate and use knowledge,
- develop the students' ability to deal with complex phenomena, issues and situations, and
- develop the students' potential for professional activities that demand considerable independence or for research and development work.

1.2 Degree Objectives, as Specified in the Higher Education Ordinance (1993:100), appendix 2:
Knowledge and Understanding
For a Master of Arts/Science (120 credits) the student shall have:
- demonstrated knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrated specialised methodological knowledge in the main field of study.

Competence and Skills
For a Master of Arts/Science (120 credits) the student shall have:
- demonstrated the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations where there is limited information
- demonstrated the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well

* 1 Credit = 1 ECTS

as the ability to evaluate this work
- demonstrated ability in speech and writing to report clearly within a national and international context and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrated the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and Approach
For a Master of Arts/Science (120 credits) the student shall have:
- demonstrated the ability to make assessments in the main field of study informed by relevant discipline, social and ethical issues and also have demonstrated awareness of ethical aspects of research and development work
- demonstrated insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrated the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

1.3 Objectives of the Programme
On completion of the programme, students shall be able to:

- Expand and develop new insights into the modelling and analysis of data so as to be able to independently design and implement robust analytical models in organisations within a given time frame.
- Manage complex, large and varying quantities of data in an organisation so as to be able to integrate and incorporate data science into the day-to-day decision-making of an organisation.
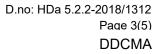- Apply specialised theoretical and practical knowledge so as to be able to critically analyse, evaluate, synthesise and model data.
- Communicate theories, methods and results of data analyses and knowledge to data science specialists and non-specialists using appropriate techniques.
- Critically analyse and evaluate the relevant tools that an organisation uses so as to both better understand its operations and to provide support for decision-making.
- Demonstrate leadership skills, innovation and independence in study situations and work situations that require solutions to problems in which many factors interact.
- Review and reflect on social and ethical aspects, and norms and conditions, and act to change these, especially in cases that involve the processing of sensitive and confidential data: for example, information about banking clients, credit cards, patients and suchlike.

* 1 Credit = 1 ECTS

2. Main Structure of the Programme

The Data Science Programme provides students with an intensive and broad education in data collection, data processing, information analysis, information modelling and decision-making, which are components in the so-called Business Intelligence chain (BI). The programme integrates the most important components from Artificial Intelligence, data analysis of business data, and information systems with statistical principles. The design aims both to develop the ability of students to meet increasing global challenges in their careers and to give capacity to work within such diverse areas as data analysis research to enterprise management.

In year one, students broaden their knowledge and skills in the main field of study, Microdata Analysis. A number of courses at the start of the programme lay the foundation for the rest of the programme. Courses in the first year focus on the analysis of business data using statistical and computer science methods in a BI context. Additionally, questions relating to data collection and data quality are discussed. By the end of the first year, the foundation for how to utilise various technologies will have been laid. The first year of the programme is when students gain practical skills in collecting, storing and analysing data.

In year two, students are taught about and tested on issues that are relevant to data modelling and data analysis. Second-year courses aim to deepen and broaden the knowledge that students acquire in the first year. For example, students gain a deeper knowledge of data modelling and also learn how to analyse spatial data. In the second year, students formulate a basic outline for their thesis work. In the plan, a problem is identified and a research outcome is formulated. The plan must describe how the problem will be solved and what material the work will be based on, as well as how access to this can be assured. In addition, the plan outlines what the student needs to learn to be able to complete the thesis, and on the basis of these needs, appropriate elective courses are chosen. The plan is presented to a supervisory group. In the final semester, students complete their thesis work. The thesis work can be methodological in nature and contribute to the development of methods and techniques within the field of microdata analysis. It can also be practical in nature and aim to strengthen the BI chain of an organisation or improve it in some form.

3. Courses of the Programme

All courses belong to the main field of study, Microdata Analysis.

Business Intelligence, second cycle 7.5 credits
Data Collection and Data quality, second cycle 7.5 credits

Data-Driven Leadership, or Economics of Leadership, second cycle 7.5 credits
Machine Learning, second cycle 7.5 credits
Statistical Learning, second cycle 7.5 credits
Thesis for Master Degree in Microdata analysis, second cycle, 30 credits

Elective courses:
Data Analysis and Visualization, second cycle 7.5 credits
Data Warehousing, second cycle 7.5 credit
Spatial Data and GIS, second cycle 7.5 credits
Complexity and Operations Research Methods, second cycle 7.5 credits
Logic and Mathematics for Computer Science, first cycle 7.5 credits
Python- and R-programming, first cycle 7.5 credits
Risk Analysis, second cycle 7.5 credits
Internship in Data Science, second cycle 7.5 credits

4. Degree Awarded
Degree of Master of Science (120 Credits), Main Field of Study: Microdata Analysis.
(Filosofie Masterexamen, huvudområde: Mikrodataanalys).

5. Required Entry Qualifications
Bachelor's degree in Data Science comprising at least 180 credits and English 6

6. Other Information
The language of instruction is English.

Upon request, the name of the programme can be included on the degree certificate in those cases where the student has successfully completed the mandatory courses in the programme.

Approved:
Approved by the University Faculty Board 11 October 2018
Valid from Autumn semester 2018

Revised:
Revised, 1 March 2022
Revision is valid from Spring semester 2022