

# Education plan

for

**Master's Programme in Decision analysis and Data science**  
**Masterprogram i beslutsanalys och data science**

**120.0 Higher Education  
Credits**  
**120.0 ECTS credits**

**Programme code:** SBDSO  
**Valid from:** Autumn 2019  
**Date of approval:** 2018-05-30  
**Department:** Department of Computer and Systems Sciences

## Decision

This programme syllabus was approved by the Social Sciences Faculty Board 2018-05-30.

## Prerequisites and special admittance requirements

A Bachelor degree with at least 180 ECTS, including a 15 ECTS independent degree project or thesis.

Language requirements: English 6 or the equivalent.

Specific requirements: At least 15 ECTS in programming or mathematics.

## Programme structure

The programme begins with a year focusing on the basic concepts for analytical decision support and risk management. The first year also provides the basics of data science.

During the second academic year, the student selects and deepens his/her knowledge in either risk and decision analysis or data science.

Risk and decision analysis focuses on decision support applications in order to improve the ability to make rational decisions in complex domains such as security, climate, infrastructure, i.e. domains often characterized by conflicts of interests, risks and multiple interests. Areas such as optimization and logic also belong to risk and decision analysis.

Data science focuses on algorithms and approaches to find properties in heterogeneous data, often to make better decisions. Areas such as data mining, machine learning and statistics belong to data science.

The programme prepares students to a broad and exciting labour market, with professional opportunities in both the public and the private sector, with professions in policy analysis, marketing, information security and data analysis.

## Goals

In addition to the general learning goals stated in chapter 1, paragraph 9 of the Swedish Higher Education Act, the following goals according to Higher Education Ordinance are applied.

### Knowledge and Understanding

For a Degree of Master the student shall:

- demonstrate 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

- demonstrate specialised methodological knowledge in the main field of study.

#### Skills and Abilities

For a Degree of Master the student shall:

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information,
- demonstrate 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 as the ability to evaluate this work,
- demonstrate the ability to clearly report and discuss both orally and in writing own conclusions and the knowledge and argumentation which they are based on, in dialogue with different audiences in national and international contexts, and
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

#### Assessment Ability and Approach

For a Degree of Master the student shall:

- demonstrate the ability to make assessments in the main field of study taking into account relevant scientific, social and ethical aspects, and demonstrate an awareness of ethical aspects of research and development,
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal needs for further knowledge and to take responsibility for own continuous learning.

In addition to the above mentioned goals, the following goals are applied:

For a Degree of Master the student shall:

- demonstrate knowledge of basic logic, argumentation theory and decision theory,
- be able to structure and analyse complex decision-making problems using decision analysis, quantitative modelling and computer-based decision support,
- be able to handle different types of uncertainty in both risk and decision analysis
- be able to structure and analyse risks as well as have good knowledge of formal risk analysis
- be able to assess the quality of bases for decisions and risk analyses
- be able to select appropriate data management approaches, based on the available data, and evaluate their results.

#### Courses

All courses are in the main field of study: Computer and Systems Sciences.

The course Decision Support Methods, 7,5 credits, is from the first cycle, the other courses are from the second cycle.

The courses described below are mandatory within the programme. The language of instruction is English.

#### First Semester

- Decision Support Methods, 7,5 credits
- Risk Management, 7,5 credits
- Decision Theory, 7,5 credits
- Scientific Communication and Research Methodology, 7,5 credits

#### Second Semester

- Analysis of Bases for Decisions, 7,5 credits
- Programming for Data Science, 7,5 credits
- Business Analytics, 7,5 credits
- Research Methodology for Computer and Systems Sciences, 7,5 credits

#### Third Semester

Choice - Risk and decision analysis track:

- Logic, 7.5 credits
- Risk and Decision Analysis: special problems, 7.5 credits
- Methodology of Decision Analysis with Advanced Applications, 15 credits

Choice - Data science track:

- Data Mining in Computer and Systems Sciences, 7.5 credits
- Research Topics in Data Science, 7.5 credits
- Big Data with NoSQL, 7.5 credits

- Elective course in Computer and Systems Sciences, from a list provided by the department, 7.5 credits

Fourth Semester

- Master's Thesis in Computer and Systems Sciences, 30 credits

**Degree**

The programme leads to a Degree of Master of Science in the main field of study: Computer and Systems Sciences.

The specialization is in decision support and risk analysis.

**Misc**

Admitted students, who have not completed their studies within the planned academic years, may complete the programme even after the programme syllabus has expired. In this case, the limitations stated in the syllabi for the courses included in the programme apply.