# PROGRAMME SYLLABUS

## Data Science - masterprogram
Data Science - Master's Programme
120 credits

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<th>Programme Code:</th>
<th>DSCMA</th>
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<td>Advanced level</td>
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The Programme Syllabus is valid from: Autumn term 2020
Date of Approval: 7 March 2019

## 1 Name and Scope of the Study Programme
The programme is provided by the University of Skövde and is named Data Science - Master's Programme. It comprises 120 credits.

## 2 General Objectives
Courses and study programmes on the advanced level shall involve the acquisition of specialist knowledge, competence and skills in relation to courses and study programmes on the basic level, and in addition to the requirements for courses and study programmes on the basic level shall:

- further develop the ability of students to integrate and make autonomous use of their knowledge,
- develop the students’ ability to deal with complex phenomena, issues and situations, and
- develop the students’ potential for professional activities that demand considerably autonomy, or for research and development work.

(Objectives for courses and study programmes on the advanced level, The Higher Education Act)

## 3 Programme Objectives
The main area of education is informatics with a specialisation in data science (the science of designing and utilizing information systems for the extraction of knowledge from large volumes of data ("big data").

**Objectives for Master's Degree according to the Higher Education Ordinance**

**Knowledge and understanding**

For a Degree of Master (120 credits) 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.

**Competence and skills**
For a Degree of Master (120 credits) 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 in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or autono-
Judgement and approach
For a Degree of Master (120 credits) the student shall
- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work,
- 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 need for further knowledge and take responsibility for his or her ongoing learning.

Local Objectives for the Study Programme according to the University of Skövde
After completion of the study programme, the student should be able to show:
- wide knowledge and understanding of fundamental theories, methods and techniques within data science, and various tools for data science including how these tools are utilized in different domains,
- considerable in depth knowledge regarding current research and development within intelligent data analysis,
- considerable in depth knowledge regarding current research and development within programming and system sciences for data science,
- considerable in depth knowledge regarding recent research and development within decision support for data science.

4 Programme Content
The study programme provides wide and deep knowledge and understanding of the area of education, with considerable in depth knowledge within the computer science specialisation of informatics. The main focus of the study programme is data science, which can be described as the science concerned with the development and use of information systems for extracting knowledge from big data. The programme, which contains a large amount of practical assignments, provides a holistic perspective on data science. This entails the study of different theories, methods and techniques that aim at using all relevant, most often, complex and heterogeneous, data for the purpose of supporting and providing insight to a decision maker. The main contents of the programme are within artificial intelligence (AI), data mining, programming, visual data analysis, business intelligence, and decision support for big data (large quantities of complex data).

The study programme has a main theme that focuses on basic and wide understanding of informatics, the main area of education, and on central areas of data science, e.g., programming and AI. This fundamental knowledge is deepened and applied through different methods for visual data analysis and data mining and in an individual project in which the students can solve a chosen problem within data science. Application and synthesis of analysis methods and theories within decision making and analysis of complex data structures, in particular within the area of business intelligence, constitute a third theme. The study programme ends with a master degree project where the student is trained in identifying and approaching a problem within data science from a scientific perspective. The student has the possibility to extend and elaborate upon a problem encountered in the previous courses or, alternatively, formulate a new problem based on what has been learned throughout the programme.

The study programme comprises the following courses:
- Advanced Artificial Intelligence A1N, 7.5 credits
- Advanced Programming A1N, 7.5 credits
- Analysis of Complex Data A1F, 7.5 credits
- Big Data Programming A1F, 7.5 credits
- Business Intelligence A1F, 7.5 credits
- Data Driven Decision-making A1F, 7.5 credits
- Data Mining A1N, 7.5 credits
- Data Science Project A1F, 15 credits
- Information Fusion A1F, 7.5 credits
- Master Degree Project in Informatics with Specialization in Data Science A2E, 30 credits
- Scientific Theory in Informatics A1N, 7.5 credits
5 Admission Requirements
A Bachelor’s degree (equivalent to a Swedish Kandidatexamen) within the fields of Informatics, Computer Science or similar, as well as skills equivalent to 15 credits in Programming and 15 credits in Mathematics or Statistics.

A further requirement is proof of skills in English equivalent of studies at upper secondary level in Sweden, known as English course 6 / English course B. This is normally demonstrated by means of an internationally recognized test, e.g. IELTS, TOEFL or the equivalent.

The above admission requirements apply for admission to the programme. For further studies within the programme, the admission requirements for each course must be complied with. These admission requirements are specified in each separate course syllabus.

6 Degree
Those who complete the programme’s courses with a pass grade also comply with the requirements for Degree of Master of Science (120 credits) with a major in Informatics.

Degrees are awarded after application. Information about how to submit an application can be found on the University’s website.

7 Approval of Study Programme and Programme Syllabus
The study programme was approved by the Vice-Chancellor at the University of Skövde on 25 September 2014. This programme syllabus was approved by the Curriculum Committee for Informatics on 7 March 2019. It is valid from the autumn semester of 2020 and replaces the programme syllabus approved on 17 May 2018.

8 Changes to the Programme Syllabus
The programme studies are carried out in accordance with the current programme syllabus in effect at the time when the studies were initiated, provided that the structure of the programme is followed and that no leave of studies has been granted.

In the event of continued studies after a period of approved leave of studies, the students is to follow the programme syllabus in effect the term that the student resumes his/her studies. If substantial changes to the programme syllabus have been made, the student may contact a student and career counsellor in order to set up an individual study plan.

Reservations are made for the fact that the programme syllabus and its courses are subject to change, within the framework of the objectives of the programme.

9 Additional Information
The teaching is conducted in English.

Further information about the study programme will be available on the University’s web pages prior to a programme start.

National and local regulations for higher education are available on the University’s website.

During the programme, as well as after its completion, there are follow-ups. The main purpose of these follow-ups is to contribute to improvements of the programme. The students’ experiences and views constitute one of the criteria for the follow-up and are gathered by means of programme evaluations. The students will be informed of the results of the follow-up and any decisions regarding actions that are to be taken.