

Syllabus for

Academic year 2019/2020 ▼ >

DAT405 - Introduction to data science and AI

Introduktion till data science och AI

Syllabus adopted 2019-02-21 by Head of Programme (or corresponding)

Owner: MPDSC

7,5 Credits

Grading: TH - Five, Four, Three, Fail

Education cycle: First-cycle

Major subject: Information Technology, Mathematics

Department: 37 - COMPUTER SCIENCE AND ENGINEERING

Course round 1

Teaching language: English

Open for exchange students: No

Maximum participants: 30

Only students with the course round in the programme plan

Credit distribution

Module			Sp1	Sp2	Sp3	Sp4	Summer course	No Sp	Examination dates
0119	Written and oral assignments	7,5c Grading: TH	7,5c						

In programs

MPDSC DATA SCIENCE AND AI, MSC PROGR, Year 1 (compulsory)

Examiner:

Marina Axelsson-Fisk

 [Go to Course Homepage](#)

Course round 2

Teaching language: English

Open for exchange students: No

Maximum participants: 80

Only students with the course round in the programme plan

Credit distribution

Module			Sp1	Sp2	Sp3	Sp4	Summer course	No Sp	Examination dates
0119	Written and oral assignments	7,5c Grading: TH			7,5c				

In programs

MPALG COMPUTER SCIENCE - ALGORITHMS, LANGUAGES AND LOGIC, MSC PROGR, Year 1 (elective)

MPCSN COMPUTER SYSTEMS AND NETWORKS, MSC PROGR, Year 1 (elective)

MPSOF SOFTWARE ENGINEERING AND TECHNOLOGY, MSC PROGR, Year 1 (elective)

TKITE SOFTWARE ENGINEERING, Year 3 (elective)

Examiner:

Marina Axelsson-Fisk

Eligibility:

In order to be eligible for a first cycle course the applicant needs to fulfil the general and specific entry requirements of the programme(s) that has the course included in the study programme.

Course specific prerequisites

Mathematics (at least 22.5cr., including Analysis, Linear Algebra, and Mathematical Statistics), Programming in a General-Purpose Language (e.g. C/C++/Java/Python or similar (at least 7,5 cr.))

Aim

The course gives a broad introduction to various techniques and theories used in Data Science and AI, with particular focus on their practical applications.

Learning outcomes (after completion of the course the student should be able to)

On successful completion of the course the student will be able to:

Knowledge and understanding

- describe fundamental types of problems and main approaches in data science and AI
- give examples of data science and AI applications from different contexts
- give examples of how stochastic models and machine learning (ML) are applied in data science and AI
- explain basic concepts in classical AI, and the relationship between logical and data driven, ML-based approaches within AI.
- briefly explain the historical development of AI, what is possible today and discuss possible future development.

Skills and abilities

- use appropriate programming libraries and techniques to implement basic transformations, visualizations and analyses of example data
- identify appropriate types of analysis problems for some concrete data science applications
- implement some types of stochastic models and apply them in data science and AI applications
- implement and/or use AI-tools for search, planning and problem solving
- apply simple machine learning methods implemented in a standard library

Judgement and approach

- justify which type of statistical method is applicable for the most common types of experiments in data science applications
- discuss advantages and drawbacks of different types of approaches and models within data science and AI.
- reflect on inherent limitations of data science methods and how the misuse of statistical techniques can lead to dubious conclusions
- critically analyze and discuss data science and AI applications with respect to ethics, privacy and societal impact
- show a reflective attitude in all learning

Content

During the course, a wide selection of methods for Data Science and AI will be introduced. The course is divided into three parts:

Introduction to data science

- Implementation of data science solutions, using Python, basic data analysis and visualization.
- Introduction of the data science process, and appropriate methodology.
- Examples of core data science methods with case studies such as in clustering, classification and regression.
- Data science put in context regarding ethics, regulations and limitations.

Statistical methods for data science and AI

- Introduction of some common stochastic models with examples of applications in data science and AI (for instance, naive Bayes classifiers, topic models for text and Hidden Markov Models for sequence data).

Artificial Intelligence

- Introduction to classical AI and machine learning, including the relationship to related areas such as algorithms and optimization, and AI philosophy.
- Examples of methods and applications of AI, in classical AI (search and constraint satisfaction), and ML-based (search engines, naive Bayes and neural networks)
- Discussion of ethics and societal impact of AI.

Organisation

Lectures and weekly assignments done in pairs.

Examination including compulsory elements

Weekly assignments. No exam.