

[Autumn 2023](#) ▼

Official course description:

Full info last published 22/11-23

COURSE INFO

Language:

English

ECTS Points:

15

Course Code:

BSMALEA1KU

Participants Max:

80

Offered To Guest Students:

Yes

Offered To Exchange Students:

Yes

Offered As A Single Subject:

Yes

Price For EU/EEA Citizens (Single Subject):

21250 DKK

PROGRAMME

Level:

Bachelor

Programme:

BSc In Data Science

STAFF

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COURSE SEMESTER

Semester
Efterår 2023
Start
28 August 2023
End
26 January 2024

ABSTRACT

This course gives a fundamental introduction to machine learning (ML) with an emphasis on statistical aspects. In the course, we focus on both the theoretical foundation for ML and the application of ML methods.

DESCRIPTION

The course enables students to analyse machine learning algorithms, implement abstractly specified machine learning methods in an imperative programming language, modify machine learning methods to analyse practical datasets, and convey the results.

The course gives an overview of fundamental concepts and reasoning behind machine learning methods, based especially on a probabilistic and decision-theoretic framework. Further, we discuss a broad range of classical machine learning methods such as

- k-nearest neighbours
- Linear models for regression and classification
- Neural networks
- Support vector machines
- Decision trees
- Ensemble methods
- Clustering methods
- Dimensionality reduction

FORMAL PREREQUISITES

The course is mandatory for third semester in the BSc in Data Science and assumes students to have followed the courses [Applied Statistics](#) and [Linear Algebra and Optimisation](#), or something equivalent.

Prior experience with Python is assumed.

INTENDED LEARNING OUTCOMES

After the course, the student should be able to:

- Discuss, clearly explain, and reflect upon central machine learning concepts and algorithms.
- Choose among and make use of the most important machine learning approaches in order to apply (match) them to practical problems.
- Implement abstractly specified machine learning methods in an imperative programming language.
- Combine and modify machine learning methods to analyse practical dataset and convey the results.

LEARNING ACTIVITIES

The course will comprise around 11 weeks of lectures and exercise sessions and around 3 weeks of project work.

COURSE LITERATURE

The main course book is:

An Introduction to Statistical Learning by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani

Further suggested reading:

Aurélien Géron (2019). *Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow*. O'Reilly.

Christopher Bishop (2006). *Pattern Recognition and Machine Learning*. Springer.

STUDENT ACTIVITY BUDGET

Estimated distribution of learning activities for the typical student

- Preparation for lectures and exercises: 37%
- Lectures: 11%
- Exercises: 11%
- Project work, supervision included: 16%
- Exam with preparation: 25%

ORDINARY EXAM

Exam type:

D: Submission of written work with following oral, External (7-point scale)

Exam variation:

D2G: Submission for groups with following oral exam supplemented by the submission. Shared responsibility for the report.

Exam submission description:

A project report on the analysis of a dataset using machine learning methods.

Group submission:

Group

2-3

Exam duration per student for the oral exam:

20 minutes

Group exam form:

Individual exam : Individual student presentation followed by an individual dialogue. The student is examined while the rest of the group is outside the room.

REEXAM

Exam type:

B: Oral exam, External (7-point scale)

Exam variation:

B22: Oral exam with no time for preparation.

Exam duration per student for the oral exam:

30 minutes

TIME AND DATE

Ordinary Exam - submission Wed, 3 Jan 2024, 08:00 - 14:00

Ordinary Exam Mon, 22 Jan 2024, 09:00 - 21:00

Ordinary Exam Tue, 23 Jan 2024, 09:00 - 21:00

Ordinary Exam Wed, 24 Jan 2024, 09:00 - 21:00

Ordinary Exam Thu, 25 Jan 2024, 09:00 - 21:00

Reexam Mon, 18 Mar 2024, 09:00 - 12:00

Reexam Wed, 20 Mar 2024, 14:00 - 19:00