



COURSE SYLLABUS

Maskininlärning

Machine Learning

7.5 credits (7,5 högskolepoäng)

Course code: DV2626

Main field of study: Computer Science

Disciplinary domain: Technology

Education level: Second cycle

Specialization: AIF - Second cycle, has second cycle course/s as entry requirements

Language of instruction: English

Applies from: 2023-08-28

Approved: 2023-03-01

1. Decision

This course is established by Dean 2022-05-03. The course syllabus is approved by Head of Department of Computer Science 2023-03-01 and applies from 2023-08-28.

2. Entry requirements

Admission to the course requires completed course in Algorithms and Data Structures, 6 credits and taken course in Applied Artificial Intelligence, 6 credits.

3. Objective and content

3.1 Objective

The main purpose of the course is to introduce theory and methods from machine learning and real-world applications from data mining. The technological development has increased our dependency on databases for storage and processing of information. The number and size of these databases grow rapidly. Due to this growth, it becomes more difficult to manually extract useful information. We therefore need semiautomatic and automatic methods to use, aggregate, analyze, and extract such information. Methods and techniques from machine learning, data mining, and artificial intelligence have been shown to be useful for these purposes.

3.2 Content

The course comprises the following themes:

- Current and future learning systems: motivation, goals, theories, and existing methods as well as basic research and application trends.
- Development of learning systems: planning, design, implementation, and testing of learning systems.
- Directions and areas within learning systems: supervised learning, unsupervised learning, classification, meta learning.
- Evaluation of learning systems: approaches, methods, and measures for evaluation and validation of learning systems.

4. Learning outcomes

The following learning outcomes are examined in the course:

4.1 Knowledge and understanding

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

- exhaustively define and describe solvable and tractable learning problems.
- broadly explain and summarize results from the application and evaluation of learning systems.

4.2 Competence and skills

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

- exhaustively modify or create and apply learning systems to different learning problems.
- exhaustively plan and execute experiments to evaluate and compare learning systems.

4.3 Judgement and approach

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

- exhaustively evaluate and compare learning systems for different learning problems given various evaluation criteria.
- exhaustively evaluate and compare methods and measures for evaluation of learning systems.

5. Learning activities

The education comprises lectures and laboratory sessions that together contribute to the theoretical understanding and practical ability required to analyze, implement, and evaluate learning systems. The purpose of the laboratory sessions is to introduce platforms, tools and APIs for machine learning. The acquired knowledge is evaluated and increased through assignments, where subject-related problems must be solved either by implementing custom learning systems or by applying existing tools. In addition, the course includes team project of at least a two-students in which a subject-related problem must be defined theoretically and solved practically according to the state-of-practice and state-of-the-art. The solution, or solutions, must be evaluated/compared experimentally and the results must be analyzed and summarized in a project report. If existing theory, methods, or tools are used, they must be clearly identified by motivation, citation, and description in the assignment submission or project report. This course uses a learning platform for publication of course contents and information. The platform also hosts discussion forums, assignment and project submission, and feedback.

6. Assessment and grading

Modes of examinations of the course

Code	Module	Credits	Grade
2310	Written assignment 1	1 credits	GU
2320	Written assignment 2	1 credits	GU
2330	Project	5.5 credits	AP

The course will be graded A Excellent, B Very good, C Good, D Satisfactory, E Sufficient, FX Fail, supplementation required, F Fail.

The information before a course occasion states the assessment criteria and make explicit in which modes of examination that the learning outcomes are assessed.

An examiner can, after consulting the Disability Advisor at BTH, decide on a customized examination form for a student with a long-term disability to be provided with an examination equivalent to one given to a student who is not disabled.

7. Course evaluation

The course evaluation should be carried out in line with BTH:s course evaluation template and process.

8. Restrictions regarding degree

The course can form part of a degree but not together with another course the content of which completely or partly corresponds with the contents of this course.

9. Course literature and other materials of instruction

Main literature

Machine Learning: The Art and Science of Algorithms that Make Sense of Data Författare: Peter Flach

Förlag: Cambridge University Press Utgiven: 2012, Antal sidor: 396

ISBN13: 9781107096394

Reference literature

Evaluating Learning Algorithms: A Classification Perspective Authors: Japkowicz, N., Shah, M.

Publisher: Cambridge University Press Published: 2011, Number of pages: 424

ISBN10: 0521196000

ISBN13: 9780521196000

Data Mining: Practical Machine Learning Tools and Techniques, Third ed

Författare: Witten, I., Frank, E., Hall, Mark A. Förlag: Morgan Kaufmann Utgiven: 2011, Antal sidor: 664

ISBN10: 0123748569

ISBN13: 9780123748560

Probability and Statistics for Engineers and Scientists, Ninth edition / International edition Författare: Walpole, R., Myers, R., Myers, S., Ye, K. Förlag: Pearson

Utgiven: 2011, Antal sidor: 816

ISBN10: 0321748239

ISBN13: 978032174823

10. Additional information

This course replaces the course DV2578