



COURSE SYLLABUS

Djup maskininlärning Deep Machine Learning 7.5 credits (7,5 högskolepoäng)

Course code: DV2586
Main field of study: Computer Science
Disciplinary domain: Technology
Education level: Second cycle
Specialization: AIN - Second cycle, has only first cycle course/s as entry requirements

Language of instruction: English
Applies from: 2023-01-16
Approved: 2022-09-01

1. Decision

This course is established by Dean 2018-05-18. The course syllabus is approved by Head of Department of Computer Science 2022-09-01 and applies from 2023-01-16.

2. Entry requirements

Admission to the course requires taken course Machine learning 6 credits.

3. Objective and content

3.1 Objective

Deep machine learning methods are extensively used in a wide variety of applications in different fields such as speech understanding, computer vision, natural language processing, robotics etc. The purpose of the course is to introduce students to deep learning, from discussing basics of machine learning and neural networks, to understand how Convolutional Neural Networks (CNNs) and recent important advances in deep learning models, such as Deep Recurrent and Recursive Networks, Autoencoders, Generative Adversarial Networks (GAN), Long Short-Term Memory (LSTM), VGG, Resnet and DensNet are designed and work.

3.2 Content

- Introduction to basics of Artificial Neural Networks,
- Activation functions, regularization, cost functions, optimization, and data normalization,
- Deep machine learning,
- CNNs: operators, drop out, convolutional layers,
- Deep Recurrent, Long Short-Term Memory, and Recursive Networks,
- Deep Belief Networks,
- Advanced Deep classification methods: VGG, Resnet and DensNet,
- Autoencoders: encoding and decoding,
- Adversarial Learning and Generative Adversarial Networks (GANs),
- Applications of deep learning methods in different domains, e.g., use of deep learning methods in natural language processing and computer vision.

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:

- explain fundamentals of deep machine learning and key subject areas
- understand and possess advanced knowledge within the area of deep machine learning
- understand real world applications of deep machine learning methods

4.2 Competence and skills

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

- design, develop and apply deep machine learning methods when carrying out research and development activities for the relevant problems

- train, validate, test and tune hyperparameters of deep machine learning methods
- implement deep machine learning solutions to relevant problems using a programming language

4.3 Judgement and approach

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

- evaluate the performance of basic and advanced deep machine learning applications
- critically review the relevant literature of basic and advanced deep machine learning methods

5. Learning activities

The course is taught in form of lectures which provide a foundation in knowledge-related learning. The exercises, laboratory and project, gives students the opportunity to train general abilities and skills and approaches (according to learning outcome descriptions).

6. Assessment and grading

Modes of examinations of the course

Code	Module	Credits	Grade
2305	Written assignment I	2 credits	GU
2315	Written assignment 2	2 credits	AF
2325	Project	3.5 credits	AF

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

The final grade is based on a weighting of the project's and the Written assignment II's grades where the extent (in credit points) affects how weight is given to a component. The Written assignment I has to be completed in order for a final grade to be issued.

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

Book -1:

Deep Learning

Publisher: MIT Press

Authors: Ian Goodfellow, Yoshua Bengio, Aaron Courville

ISBN: 978-0262035613

Year: 2016

Book -2:

Deep Learning with Python Second Edition

Author: Francois Chollet

Publisher: Manning

ISBN: 978-1617296864

Year: 2021