Faculty of Health, Science and Technology
Computer Science

Syllabus

Applied Machine Learning

Course Code:	DVGC27
Course Title:	Applied Machine Learning *Tillämpad maskininlärning*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

Major Field of Study:
DVA (Computer Science)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2020-03-11, and is valid from the Autumn semester 2020 at Karlstad University.

Prerequisites
Data Structures and Algorithms (7.5 ECTS credits) and Discrete Mathematics (7.5 ECTS credits), or equivalent

Learning Outcomes
Upon completion of the course, students should be able to:
- explain basic machine learning terminology, principles, and theory, such as learning, classification, cross-validation, and overfitting,
- explain the principles behind classical machine learning algorithms based on linear classification, decision trees, and cluster analysis,
- explain basic terminology, principles, and theory of deep machine learning, such as neural networks, the universal approximation theorem, and descent through the gradient method,
- give an account of the most common types and models of neural networks,
- apply techniques and theories of deep machine learning through using popular libraries

and tools with open source code to practice, adapt, and use existing models of deep machine learning, in accordance with instructions, and
- apply suitable measures for the evaluation of a machine learning algorithm based on the structure and context of a data set.

Content
The course provides an introduction to machine learning with a focus on applied deep machine learning.

The first part of the course covers the basics of machine learning, including relevant theory, terminology, and principles, and introduces both classical and deep machine learning. Instruction is mainly in the form of lectures and self-study of educational materials based on open-access sources. Some parts involve flipped classroom activities.

The second part of the course focuses on applied deep machine learning through a number of practical exercises and combines lectures on necessary theory with laboratory sessions. The aim is to enable students to explore problem solution independently through using popular libraries and tools with open source code for deep machine learning.

The course concludes with a laboratory task focused on deep machine learning which is presented orally in groups.

Reading List
See separate document.

Examination
Assessment is based on a written exam, laboratory assignments, and an oral final presentation.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades
One of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

The course includes laboratory tasks which require students to have access to a graphics

card, which may incur an extra cost.