

AI-related courses at Charles University

NAIL069 Artificial Intelligence I

5 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAIL069>

An introductory course on artificial intelligence with the focus on basic concepts and methods. The course requires knowledge of logic at the level of undergraduate course.

NOPT042 Constraint Programming

6 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NOPT042>

The course gives a survey of constraint satisfaction techniques. The focus is on algorithms for constraint satisfaction, such as search algorithms (depth-first search and local search) and propagation algorithms (arc and path consistency). Solving over-constrained problems is also discussed as well as some modeling techniques are covered. Basic knowledge of programming language Prolog is expected.

NMMB331 Boolean Functions and Their Applications 3 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NMMB331>

The course is devoted to vectorial nonlinear Boolean functions.

NAIL078 Lambda Calculus and Functional Programming 1 5 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAIL078>

Combinatorial calculi and lambda calculi, untyped calculi, representability of recursive functions, Church Rosser property and consistency of lambda calculus, typed lambda calculi, functional programming constructs

NAIL025 Evolutionary Algorithms I

6 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAIL025>

Models of evolution, genetic algorithms, representation and operators of selection, mutation and crossover. Problem solving by means of evolutionary computation. Theoretical properties of simple genetic algorithm. Schemata theorem and building block hypothesis, probabilistic models. Evolutionary machine learning, Michigan vs. Pittsburg approach, classifier systems.

NAIL116 Social networks and their analysis 6 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAIL116>

The concept of social networks is widely used to model mutual relationships between people (but also between other objects like chemical compounds). Intriguing problems from this area range from finding important structural patterns that influence interaction among the considered actors across sentiment analysis that studies people's opinions, emotions, and attitudes to the analysis and evolution of the network structure itself. Recently, the trends have shifted rather towards online social networks (e.g., Facebook, LinkedIn and MySpace) which allow for efficient data collection.

NAIL002 Neural Networks

9 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAIL002>

The theory of neural networks is motivated by the results achieved in the area of the central neural system research. These inventions often represent the origin for the derived

mathematical models which have (despite of significant simplifications of real neuro-physiological processes) some features of the natural intelligence. These models can be used in the design of non-traditional computational means applied in the solutions of many practical problems.

NAILO28 Introduction to Robotics 6 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NAILO28>

This introductory course overviews key topics in robotics: kinematic and dynamic model, basic components (hardware, sensors and actuators, software), control systems, introduction to localization, mapping, planning.

NPGR035 Machine Learning in Computer Vision 5 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NPGR035>

The course is focused on basic machine learning algorithms used in computer vision tasks. Practical part takes place in a computer lab equipped with Matlab.

NPFL129 Machine Learning for Greenhorns 5 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=NPFL129>

Machine learning is reaching notable success when solving complex tasks in many fields. This course serves as an introduction to basic machine learning concepts and techniques, focusing both on the theoretical foundation, and on implementation and utilization of machine learning algorithms in Python programming language. High attention is paid to the ability of application of the machine learning techniques on practical tasks, in which the students try to devise a solution with highest performance.

JPM923 Artificial Intelligence and Security 6 ECTS

<https://is.cuni.cz/studium/eng/predmety/index.php?do=predmet&kod=JPM923>

The course seeks to address so far neglected uniqueness of machine learning specifically and artificial intelligence generally in regards to security issues. There is a discernible research trend failing to distinguish that ML/AI systems differ significantly from the past technological developments that influenced the security environment. To remedy the status quo, the course offers a principled approach towards the study of these emerging security phenomena which consists of the technologically informed study. Specifically, the course will address the following areas: role of ML specifically and AI in general in relation to the key topics comprising security studies, basic functioning of machine learning, its alignment with human intentions and interests, concerns regarding fairness and bias of machine learning models, vulnerabilities in terms of adversarial attacks, issues pertaining to the deployment of machine learning model to the real world.