SYLLABUS

Name: ***Deep Learning in Data Science (MakAu-DS>SM2DLDS19F)***
Name in Polish:
Name in English: ***Deep Learning in Data Science***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Short description:

The course starts with an introduction to the topic of artificial neural networks, a description of network training, hyperparameters tuning, and model validation. Then, there is a detailed description of main types of networks: convolutional neural networks, recurrent neural networks, autoencoders, and generative adversarial networks. During the lecture, students will learn how to create, train, debug, and visualize deep learning models. During laboratories students will apply deep learning methods into areas of the image and video classification, time series analysis, and natural language processing.

Description:

ECTS: 3
Total workload: 90 hours (60 contact hours, 30 students' work hours)
Lecture 30h
Laboratory 30h
Students' own work: preparation for classes, preparation of the reports, preparation to test.

Number of ECTS points obtained in classes with direct participation of an academic teacher: 3
Number of ECTS points obtained in practical classes (laboratories, projects): 2

The lectures and laboratories include basic and advanced deep learning concepts and issues and describe commonly used models. The lecture is conducted in the form of a multimedia presentation.

Lecture topics:
• Introduction to deep learning
• Deep learning models overview
• Hyperparameter tuning, regularization, and optimization
• Convolutional Neural Networks (CNN)
• Dimensionality reduction and autoencoders
• Recurrent Neural Networks (RNN)
• Generative networks
• Deep learning in computer vision
• Deep learning in medical imaging

Laboratory topics:
• Introduction to Deep Learning with Google Colab
• Convolutional Neural Networks
• Hyperparameter tuning
• Encoder-decoder networks
• Recurrent Neural Networks
• Transfer learning
• Generative models
• Multi-task learning

Bibliography:

Deep Learning with Python. François Chollet, Manning 2017
Deep Learning. Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press 2018
Introduction to Deep Learning. Sandro Skansi, Springer 2018

Learning outcomes:

Skills: Students can use
- typical technologies used in solving engineering tasks in the field of automation, robotics, electronics, telecommunications and IT related to the subject of the selected course (K2A_U16)
- basic methods, techniques, and tools used in solving simple engineering tasks in the field of automation, robotics, electronics, telecommunications and IT related to the subject of the selected course (K2A_U18)

Assessment methods and assessment criteria:

Each laboratory is graded from 0 to 100% and the final grade from laboratories is established as an average from all laboratory grades. The final test from the lecture theory is graded from 0 to 100%. The final grade from the subject is calculated as a weighted mean: 0.3 * test grade + 0.7*laboratory grade and equals:
• 2 (fail) if <= 39.99
• 3 (dost) if from 40.00% to 49.99%
• 3.5 (pdost) if from 50.00% to 59.99%
• 4 (db) if from 60.00% to 69.99%
• 4.5 (pdb) if from 70.00% to 79.99%
• 5 (bdb) if ≥ 80.00%

The syllabus is valid from the academic year 2024/25 and its content cannot be changed during the semester.

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2020/2021-Z	