ÓBUDAI EGYETEM
NEUMANN JÁNOS INFORMATIKAI KAR

Institute of Software Enginnering			Sample Curriculm for the 4th Semester 2025-26-2			
Subject name:	Code:	Credit:	Class hours			
				Lecture	Seminar	lab
Artificial Intelligence *	NSXMI1HBNF	5	Full-time weekly	2	0	2
Supervisor: Dr. Kertész Gábor			Position:			
Instructor(s): Zhyar Kwekha Rostam						
Prerequistites:	NSXAA1HBNF	Algorithms and Data Structures *				
Assessment Methods:	Examination					

Course Content	
Objective:	Introduction to the fundamentals of artificial intelligence (AI) with a focus on machine learning in a practice-oriented approach.

Topics Covered:	• Fundamentals of AI: definitions, history, applications, opportunities, and limitations.
	• Problem formulation and solving, knowledge and problem types (P, NP, NP-complete).
	• Problem-solving using search: A*, Minimax, dynamic programming, cost optimization, iterative approaches (hill climbing, simulated annealing, genetic algorithms).
	• Representation of uncertainty, Bayes' theorem and its applications, fuzzy logic, Hidden Markov Models.
	• Machine learning basics:
	  ○ Supervised learning (classification, regression)
	  ○ Unsupervised learning (clustering)
	  ○ Linear regression, decision trees, support vector machines, perceptrons, neural networks (structure, function, and training).
	  ○ Shallow neural networks, convolutional neural networks.
	  ○ Deep neural networks, fundamentals of deep learning.
	  ○ Reinforcement learning, Q-learning.
	  ○ Basics of natural language processing.
	Lab sessions include Python and relevant libraries (NumPy, SciKit, Pandas), followed by weekly practical exercises related to the lecture topics.

Semester Schedule	
Education Week	Topic
1.	Lecture: Fundamentals of Artificial Intelligence LAB: Python Basics
2.	Lecture: Problem formulation and solving, problem types, problem-solving through search LAB: NumPy
3.	Lecture: Representing Uncertainty LAB: Pandas
4.	Lecture: Introduction to machine learning LAB: SciKit, linear regression
5.	Lecture: Supervised lerning LAB: Logistic regression, LDA, Metrics
6.	Lecture: Unsupervised lerning LAB: Support Vector Machine
7.	Lecture: Reinforcement learning LAB: Decision Tree

8.	Lecture: The artificial neuron LAB: Clustering
9.	Lecture: Basics of neural networks LAB: Advanced practice exercise
10.	Lecture: Fundamentals of deep learning LAB: Shallow neural networks
11.	Lecture: Fundamentals of convolutional neural networks LAB: mid-term exam
12.	Lecture: mid-term exam LAB: Convolutional Neural Network
13.	Lecture: Fundamentals of natural language processing LAB: Fundamentals of deep learning
14.	Lecture: Retake LAB: Retake

Semester Requirements	
Conditions for Obtaining a Semester Grade/Signature:	• Students must successfully complete the in-class tests in both the lab and lecture sessions. • The final grade for the semester is based on a 50%-50% weighting of the two tests. • A final grade can only be earned if the student has not been blocked from taking the tests due to absences and if they achieve at least a passing grade on both tests. • A make-up test is allowed once, during the last week of the semester. • In the case of a failing grade, the semester grade can only be obtained through a supplementary exam covering the relevant in-class tests. • Any use of unauthorized assistance during assessments will be sanctioned according to the Study and Examination Regulations, with the severity of the penalty depending on the violation; in extreme cases, formal disciplinary proceedings may be initiated. • If the instructor is not convinced that a student's exam answer is their own, they may request a meeting with the student to verify it.

Mid-term Exams	
Week	Exam
11	Lab Exam
12	Lecture Exam
14	Retake Exam

Method for Determining the Semester Grade (Only for Courses with Semester Grades)
The semester performance is composed of the percentage results of the lab mid-term and the lecture mid-term in a 1:1 ratio, from which the semester grade is calculated. 0-49%failed (1) 50-62% satisfactory (2) 63-74% average (3) 75-86% good (4) 87-100% excellent (5)

Make-up Procedure

Method of Making Up Mid-term Exams / Semester Grade / Signature:	Each mid-term exam can be retaken once. The make-up exam for the semester grade must cover the entire semester's material.
Exam Method (To be completed only for courses with exams)	
Formation of the Exam Grade (To be completed only for courses with exams)	
Grading of the Exam	
Recommended Literature	
Mandatory Materials:	Lecture notes and presentations
Suggested Reading:	Russell, Stuart Jonathan, and Peter Norvig. "Artificial Intelligence: A Modern Approach." (1995).
Additional Resources:	Course materials uploaded to the Óbuda University Moodle system.