COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2025/2026 SEMESTER SECOND

Course title	*INTRODUCTION TO THE APPLICATIONS OF ARTIFICIAL INTELLIGENCE*
Course Code	IVB119ANMI
Hours/Week: le/pr/lab	0/0/2
Credits	2
Degree Programme	Computer Science Engineering BSc (7-Semester Undergraduate Program)
Study Mode	
Requirements	Semester mark
Teaching Period	09.02.2026. – 15.05.2026
Prerequisites	none
Department(s)	Department of Cybersecurity and Networks
Course Director	Dr. Zsolt Ercsey
Teaching Staff	Dr. Zsolt Ercsey

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).
Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

The course is intended for students in the Computer Science Engineering BSc (7-Semester Undergraduate Program).

Artificial intelligence (AI) is an important research field that focuses on the modelling of intelligent human behaviour on a machine. The aim is to design and make a computer that can learn, reason, and solve problems autonomously, ie in such a way that the actions result reflects the result of the activities of human thinking. Even though artificial intelligence has been studied for quite a long time now, it is still a challenge to make a computer that is as intelligent as a human. There are some very specific fields where there are some success already since the Deep Blue system defeated the world chess champion, yet in other cases as well as in general, there are a lot of work in front of us.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Goals, student learning outcome.
Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

After the course, students will

- know the main areas of AI,
- have a glance into some current trends of AI,
- have some understanding what problems could be supported by AI.

In this course, the students will get familiar with the most fundamental knowledge for understanding artificial intelligence.
The Course includes practical problem solving tasks and presentations by the Students.
The course is based on continuous discussions; examine of case studies, actual topics, conventional and non-conventional situations. The students' verbal feedback is required.

Methods:

- Checking problems and solutions.
- Discussion of event cases, situations.
- A short oral presentation by the Students at a fixed time during the semester.
- Tests by the Students at a fixed time during the semester.

2. COURSE CONTENT

Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content

DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

Specific schedule of 2025/2026 Second

LECTURE, PRACTICE, LABORATORY PRACTICE

week	**Date, time, place**	**Topic**
1.	9 February, 2026 i) 13:15, A102 and ii) 15:00, A102	Orientation. Course requirements.
2.	16 February 2026 i) 13:15, A102 and ii) 15:00, A102	Legal regulation of artificial intelligence Getting familiar with the EU AI Act (Regulation 2024/1689), which entered into force on August 1, 2024. This aims to regulate the development and use of AI systems in the European Union in a safe, reliable and human-centric manner at all levels of the supply chain.
3.	23 February 2026 i) 13:15, A102 and ii) 15:00, A102	What AI Is Introduction to modern AI systems with a focus on large language models. Students develop a clear mental model of what AI can and cannot do, common misconceptions, and the difference between automation, intelligence, and statistical pattern matching. The week sets realistic expectations for AI-assisted workflows.
4.	2 March 2026 i) 13:15, A102 and ii) 15:00, A102	Tokens, Context, and Randomness Explores how language models process text using tokens, how context windows limit and shape responses, and how randomness (temperature, sampling) affects outputs. Students learn why identical prompts can produce different results and how to control variability in practice.
5.	9 March 2026 i) 13:15, A102 and ii) 15:00, A102	Prompts as Specifications Prompts are treated as functional specifications rather than casual instructions. This week covers structure, constraints, role definition, examples, and output formatting. Students learn to design prompts that are reproducible, testable, and robust in no-code environments.
6.	16 March 2026 i) 13:15, A102 and ii) 15:00, A102	Decomposition and Workflows Complex tasks are decomposed into smaller, reliable steps. Students learn to design multi-step reasoning pipelines and workflows using LangFlow, emphasizing modularity, clarity, and error isolation rather than monolithic prompts.
7.	23 March 2026 i) 13:15, A102 and ii) 15:00, A102	Safety, Ethics, and Responsibility Introduces responsible AI use, including hallucinations, bias, over-reliance, and misuse risks. Students learn practical safety patterns (refusal handling, uncertainty signaling) and discuss ethical considerations relevant to real-world AI deployment.
8.	30 March 2026 i) 13:15, A102 and ii) 15:00, A102	Tool Use Focuses on extending language models with tools (calculators, APIs, code execution, external services). Students design flows where the model decides when and how to use tools, learning the limits of pure text-based reasoning.
9.	6 April 2026 i) 13:15, A102 and ii) 15:00, A102	EASTER MONDAY
10.	13 April 2026 i) 13:15, A102 and ii) 15:00, A102	Retrieval-Augmented Generation (RAG) Covers grounding AI responses in external knowledge sources using retrieval. Students build simple RAG pipelines, learn document chunking and embeddings conceptually, and understand why retrieval improves factuality and domain reliability.
11.	20 April 2026 i) 13:15, A102 and ii) 15:00, A102	Guardrails and Domain Assistants Students design domain-specific assistants with constrained behavior. Topics include input validation, output schemas, guardrails, and domain boundaries. Emphasis is placed on building assistants that refuse gracefully and stay within scope.
12.	27 April 2026 i) 13:15, A102 and ii) 15:00, A102	Evaluation and Verification

		Introduces systematic evaluation of AI outputs. Students learn qualitative and lightweight quantitative evaluation methods, prompt regression testing, and basic verification strategies to detect errors, inconsistencies, and failure modes.
13.	4 May 2026 i) 13:15, A102 and ii) 15:00, A102	Agents and Autonomy Explores agent-like behavior, including planning, iteration, memory, and limited autonomy. Students compare simple workflows with agentic patterns and learn when autonomy adds value—and when it creates unnecessary risk.
14.	11 April 2026 i) 13:15, A102 and ii) 15:00, A102	TEST: Applied Project Design Students design and implement a complete no-code AI application using LangFlow. Emphasis is on problem formulation, architecture choices, safety considerations, and evaluation strategy rather than technical complexity.

3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

According to the university code.

Method for monitoring attendance *(e.g.: attendance sheet / online test/ register, etc.)*

An attendance sheet is used.

ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

Course resulting in mid-term grade *(PTE TVSz 40§(3))*

Mid-term assessments, performance evaluation and their ratio in the final grade *(The samples in the table to be deleted.)*

Type	Assessment	Ratio in the final grade
Test	*100 points*	*100%*

To pass homework has to be accepted plus the test result should be above 40%.
Tests by the students. All tests are in writing. Tests are evaluated by points. Tests cover all or some of the main topics of the Course. No external aids are allowed to be used. In case the performance is below 40%, the test is said to be failed. In case the test is missed it is calculated as 0 points. Should the average of the tests be below 40%, ie it is grounds for failing the course.

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

Retake is scheduled to the 14th week or later.

Grade calculation as a percentage

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

The lower limit given at each grade belongs to that grade.

Re-takes for the end-of-semester signature (PTE TVSz 50§(2))

The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

According to the general Code of Studies and Examinations. All the tests and the records to be submitted can be repeated/improved each at the end of the semester, and home assignments, i.e. the presentation can be repeated/improved in the first week of the examination period latest.

4. SPECIFIED LITERATURE

In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[1.] The material of the course will be published via Teams.

[2] EU AI Act (Regulation 2024/1689).

[3.] Stuart Russell, Peter Norvig (2005) Artificial Intelligence. A Modern Approach. Prentice Hall. 2003. ISBN 0137903952. (In Hungarian: Mesterséges intelligencia modern megközelítésben. Panem. 2005. ISBN 963 545 411 2.)

RECOMMENDED LITERATURE AND AVAILABILITY

[4.] Alison Cawsey (1998) The Essence of Artificial Intelligence. Prentice Hall. 1998. ISBN-13: 978-0135717790 (In Hungarian: Mesterséges intelligencia, alapismeretek. Panem. 2002. ISBN 963 545 285 3.)