Syllabus
«Artificial Intelligence Systems»

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Expected learning outcomes
As a result of studying the discipline, the student
must know:
- recognize and apply uninformed and heuristic state space search methods;
- recognize and apply basic machine learning algorithms;
- recognize basic models of neural networks and apply methods and algorithms for their training;
- recognize and apply evolution computation techniques, including evolutionary and genetic algorithms, ant colony and particle swarm optimizations;
- recognize basic pattern recognition algorithms and apply them to the tasks of signal processing and image analysis.

must be able to:
- ability to analyze, evaluate and apply modern software and hardware platforms for solving complex problems of computer engineering;
- to gather, analyze and evaluate information required to solve scientific and applied problems, using scientific and technical literature, databases and other sources;
- ability to modify existing and develop new algorithmic solutions for detailed computer equipment design.

The scope of the discipline: 3 ECTS credits (10 hours of lectures, 20 hours of practice), 60 hours of self-study, exam).

Purpose:
The purpose of teaching the discipline «Artificial Intelligence Systems» is to give students a systematic knowledge of the basic models, methods and tools used in the development of artificial intelligence systems, as well as to familiarize students with the basic methods of finding solutions that are used in such systems. As a result of studying the discipline students should have a general idea about objectives and tasks of research in the field of artificial intelligence, the main concepts of AI system design and the areas of AI systems application.

Originality of the academic discipline:
Author's course

The content of the discipline

Topic 1. Intelligent agents
Approaches to AI: cognitive modelling, Turing test, the laws of thought, and the rational agent. Intelligent agents and their structure. The nature and properties of environments. Multiagent systems.
Topic 2. State space search methods
The definition of state space problem. Uninformed search strategies: breadth-first, depth-first, iterative deepening, lowest-cost-first. Heuristic search strategies: best-first, A* search.
Topic 3. Population-based search
Population-based search. Evolutionary learning. Genetic algorithms.
Topic 4. Natural language processing
Parametric and nonparametric classification methods. Clustering and regression methods. Bayesian networks and Markov random fields.
Topic 5. Pattern recognition
Image processing, face detection, object detection.

Prerequisites

Disciplines "Higher mathematics", "Physics", "Sensors and transducers", "Optimization methods", "Distributed systems with cloud architecture and data storage".

Consequences

The knowledge gained during the study of the discipline can be used for the preparation of a qualification work (dissertation) and professional activity.

Semester control: exam

Evaluation:

Evaluation of student’s performance during semester: 60 points

Exam: 40 points

Types of work

Practical works – 45 points

Individual project task – 15 points

University Attendance Policy

A student enrolled in a course is expected to attend all scheduled classes. The teacher of each course informs the students about the rules regarding the absence of students. Students should be aware of this policy. The final decision on whether or not to excuse a student's absence is made by the teacher.

Attendance or participation is also expected in online courses. Participation in online courses can take different forms; it is the teacher who determines what form of attendance or participation is expected.

The teacher reserves the right to give a failing grade to a student for excessive absences.

Technical support

Lectures on "Artificial Intelligence Systems" are held in classes equipped with the necessary multimedia tools (projector, laptop).

Practices on the discipline are carried out in computer classes using Microsoft Office, Microsoft Visual Studio, Java SE, Python, C#

Deadline policy

Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade.

Academic Integrity Policy

Provides independent performance of practices. Write-off (including using mobile devices) is prohibited. The work is not credited in case of detection of plagiarism or writeoff.

Criteria for assessing knowledge

A student's answer is evaluated with a score of 9–10 points and 31–40 points on the exam (A on the ECTS scale and 5 on the national scale) if it demonstrates deep knowledge of all theoretical principles and ability to apply theoretical material for practical analysis and has no inaccuracies.

A student's answer is assessed with a score of 7–8 points and 21–30 points on the exam (B and C on the ECTS scale and 4 on the national scale) if it shows knowledge of all theoretical principles, ability to apply them in practice, but some inaccuracies are allowed.

The student's answer is evaluated with a score of 5–6 points and 11–20 points on the exam (D and E on the ECTS scale and 3 on the national scale), provided that he knows the basic theoretical principles and can use them in practice..