Syllabus
«Methods of intellectual planning»

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Expected learning outcomes
As a result of studying the discipline, the student
must know:

- basic concepts of intellectual planning;
- basic technologies used for intelligent planning;
- the basics of mathematical logic for the formal representation and solution of planning tasks.

***must be able to*:**

- apply various methods of intellectual and analytical planning;
- implement programs for solving tasks of intelligent planning.

Prerequisites
According to the educational program, it is necessary to first acquire knowledge in the following disciplines: "Higher mathematics", "Fundamentals of programming", "Object-oriented programming", "Probability theory and mathematical statistics", "Algorithms and data structures", "System analysis", "Methods and systems of artificial intelligence", "Organization of databases and knowledge".

Consequences
Competences, knowledge and skills acquired within the framework of studying this discipline can be applied to obtain reasonable research results and increase the scientific level of qualification work**.**

Technical support

The scope of the discipline: 4 ECTS credits (16 hours of lectures, 32 hours of practice).

Purpose: theoretical and practical training of future masters in the field of intelligent information systems for working with tasks of intellectual planning. The knowledge gained as a result of mastering the discipline will help in the development and planning of actions in the conditions of various types of uncertainties and unstructured information, and in the development of action planning models for intelligently controlled objects. The discipline is an integral part of the modern direction of artificial intelligence, and the graduate of the master's program needs intellectual information systems to solve various tasks of practical and research activities.

The content of the discipline

Topic 1. Introduction to Intelligent Planning. Appointment. Main tasks. Classification of planning methods. Analysis of existing methods of intelligent planning. Mathematical model of planning**.**
Topic 2. Planning based on decision theory (part 1). Formulation of the problem. Planning levels and hierarchies. Planning using the HLA methodology. Examples of hierarchical planning tasks**.**
Topic 3. Planning based on decision theory (part 2). Planning using mathematical models of dynamic programming, Markov decision-making processes and partially observable Markov processes. Examples of planning based on decision theory**.**
Topic 4. Analytical planning. Types of analytical planning. Planning based on historical experience. Use of short-term forecasting methods to solve analytical planning tasks.
Topic 5. Planning based on time constraints. Features of scheduling based on time constraints. The main elements of planning based on time constraints. The solution search space. Methods of narrowing the set of solutions**.**
Topic 6. Planning based on precedents. The concept of precedent. The structure of the precedent. Building case libraries. Implementation of the conclusion based on precedents. Software environments for the implementation of technology precedents**.**
Topic 7. Situational planning. Setting the problem of situational planning. Situational

Laboratory work on the discipline is conducted in computer classes using languages and software environments: R Studio, R, Python, Microsoft Visual Studio, Java SE, Python, C#.

Deadline Policy
Works that are submitted late without good reason will be assigned 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 write-off.

numeracy. Situational modeling. Examples of problem solving for situational planning.
Topic 8. Dynamic planning. Concept of dynamic planning. System methodology for solving dynamic planning tasks. Methods of solving dynamic planning tasks. Examples of solutions to dynamic planning tasks.
Topic 9. Environmental programs for solving tasks of intelligent planning. Features of the implementation of the software environment. GRAPHPLAN, STRIPS, DIVISER, O-PLAN environments**.**

Evaluation criteria of laboratory works / practices / individual works / reports / projects

Maximum number of points – a student with high quality independently completed the entire amount of work, answers all questions related to the completed work, and makes additional calculations offered by the teacher. The teacher has no complaints about the implementation and requirements for the performance of the work.
Approximately 70%-99% of the maximum number of points – the student completed all tasks with sufficient quality, but in the process of work he made some mistakes, which, after being pointed out by the teacher, he corrected himself. He answers some questions incorrectly. Additional calculations proposed by the teacher are done with some effort. Not all requirements for performance of work are met.
Approximately 40%-69% of the maximum number of points – the student independently completed all the work, but the quality of the implementation is insufficient (calculation errors, not all work requirements are met). The answers to questions about the performance of work are not quite clear. There are mistakes in the answers.
Approximately 1%-39% of the maximum number of points – the student did not complete all the work independently, while the quality of the implementation was insufficient (errors in calculations, does not comply with the requirements for the design of the work). He does not answer questions about the performance of work clearly. There are gross mistakes in the answers.
0 points – the student did not complete the entire amount of work, or did it with gross errors. He has problems with calculations, does not know the theoretical material, the software implementation does not meet the requirements.