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ASSESSMENT MATERIALS

Discipline Introduction to Artificial Intelligence

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Author:  
Lyash A. A.

Associate Professor  
at the Informational Technologies  
Department,

Ph.D. in Pedagogy

Approved at the meeting of  
the Informational Technologies  
Department,  
record. № 6 dated 01.02.2024

Head of the department

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signature

Lyash O.I  
name

## 1. Criteria and assessment of competencies and their mastery indicators, formed by the discipline

Code and competence name	Code and indicator of competence mastery	Results of training in the discipline (module)			Formative assessment	Interim assessment
		<i>To know:</i>	<i>To be able to:</i>	<i>To have:</i>		
<b>УК-1:</b> Can design action plans and apply systematic approach to critical analysis of problem situations	<p><b>ИД-1ук-1:</b> Applies a systematic approach for searching and analytical activities to solve the set tasks.</p> <p><b>ИД-2ук-1:</b> Collects, systematises and analyses the information necessary to develop a strategy for solving a problem situation.</p> <p><b>ИД-3ук-1:</b> Evaluates the practical consequences of possible solutions to the set tasks.</p>	<ul style="list-style-type: none"> <li>- main ways of information search;</li> <li>- main directions of artificial intelligence development, possibilities of applying artificial intelligence algorithms to address professional tasks,</li> <li>- principals of legal regulation of AI.</li> </ul>	<ul style="list-style-type: none"> <li>- critically analyse the collected information on a given issue;</li> <li>- apply a systematic approach to address professional tasks;</li> <li>- apply neural networks within professional engagement.</li> </ul>	<ul style="list-style-type: none"> <li>- skills in summarising the results of information analysis to solve the task;</li> <li>- skills in choosing ways to address specific professional tasks.</li> </ul>	<ul style="list-style-type: none"> <li>- a set of problems for laboratory classes;</li> <li>- tests;</li> <li>- essay tasks</li> <li>- tasks for compiling a glossary</li> </ul>	Results of formative assessment Final test
<b>ОПК-10</b> Can fathom the principles of modern IT and apply them to fulfil professional tasks	<b>ОПК-10.1:</b> knows possibilities and principles of modern information technologies and uses them to address tasks within professional engagement					

## 2. Competencies mastery (indicators of their mastery) level assessment

Competencies mastery (their indicators) indices	Criteria and grading system of competencies mastery (indicators of their mastery) assessment			
	Insufficient («unsatisfactory»)	Sufficient («satisfactory»)	Above average («good»)	Advance («excellent»)
<b>Extent of knowledge</b>	Knowledge level is below the required. Major mistakes occurred.	Minimally allowed knowledge level. Minor mistakes occurred.	Knowledge level corresponds well to the educational programme. Minor errors occurred.	Knowledge level corresponds well to the educational programme.
<b>Ability mastery</b>	Basic abilities were not demonstrated during standard tasks completion. Major mistakes occurred.	Basic abilities were demonstrated. All tasks were completed, yet not in full (clarifications are absent, conclusions are incomplete)	All main abilities were demonstrated. All tasks were completed in full, yet with few errors.	All main abilities were demonstrated. All main and additional tasks were completed without mistakes or errors.
<b>Skill mastery (having experience)</b>	Basic skills were not demonstrated during standard tasks completion. Major mistakes occurred	Minimum set of skills for standard tasks completion with minor error, is acquired.	Basic skills were demonstrated in completing standard tasks, yet with few errors.	All main skills were demonstrated in completing main and additional tasks without mistakes or errors.
<b>Competence mastery characteristics</b>	Competencies have not been acquired. The acquired knowledge, skills, and abilities are not enough to solve practical (professional) tasks. OR Insufficient number of credit points as per the established range.	Competencies mastery is adequate. The acquired knowledge, abilities, and skills are mostly sufficient to complete professional tasks. OR Sufficient number of credit points is earned as per the established range.	Competencies mastery mainly satisfies the requirements. The acquired knowledge, abilities, and skills are mainly sufficient to complete professional tasks. OR Sufficient number of credit points is earned as per the established range.	Competencies mastery satisfies the requirements to the full extent. The acquired knowledge, abilities, and skills are fully sufficient to complete difficult professional tasks, including non-standard. OR Sufficient number of credit points is earned as per the established range.

### 3. Criteria and grading system of the formative assessment tasks

#### 3.1. Criteria and grading system of laboratory classes

The list of laboratory classes, task completion and presentation recommendations, requirements for results, structure, and contents of report, etc., are presented in methodological guidelines on mastering the discipline as well as in MAU LMS Moodle

Points	Assessment criteria
<i>13-15</i>	The task is completed correctly and in full. The report is well-prepared and satisfies the requirements. Answers to the teacher's questions (during the presentation) are full.
<i>10-12</i>	The task is completed in full, yet without sufficient justification or a minor error, which does not impact the argumentation sequence, occurred. All task completion requirements are satisfied.
<i>6-9</i>	The task is completed partially, with mistakes. Adequate level of completed laboratory or practical tasks. Majority of task completion requirements are satisfied.
<i>0-5</i>	The task is completed with a significant number of mistakes, demonstrated a low level of performance. Many of the requirements are not met. OR The task is not completed.

#### 3.2. Criteria and grading system of tests

The list of test questions and tasks, as well as test procedure description are presented in methodological guidelines on mastering the discipline, as well as in MAU LMS Moodle.

Typical test questions:

1. **What is the background for the emergence of artificial intelligence as a science?**
  - a. advent of computers
  - b. development of cybernetics, mathematics, philosophy, psychology, etc.
  - c. science-fiction
  
2. **When was the term “artificial intelligence” coined?**
  - a. 1856
  - b. 1956
  - c. 1954
  - d. 1950
  
3. **Who is considered the founder of artificial intelligence?**
  - a. A. Turing
  - b. Aristotle
  - c. R. Lully
  - d. Descartes
  
4. **Choose a proof(s) supporting that artificial intelligence can possibly match or surpass human intelligence in a number of intellectual tasks (albeit in limited conditions):**
  - a. a computer beat a human in chess
  - b. the ability of a computer to speak
  - c. the ability of a computer to perform complex computing operations
  - d. the ability of a computer to move
  
5. **Which programming language was developed within the framework of artificial intelligence?**
  - a. Pascal
  - b. C++
  - c. Lisp
  - d. OWL
  - e. PHP

**6. How many generations of robots exist?**

- a. 1
- b. 2
- c. 3
- d. 4

**7. What tasks are solved within the framework of artificial intelligence?**

- a. speech recognition
- b. decision making
- c. coding
- d. creation of information system development environments
- e. creating computer games

**8. Choose areas which actively used expert knowledge:**

- a. expert systems
- b. cognitive modeling
- c. pattern recognition
- d. computational linguistics

**9. Intelligent information system is a system ...**

- a. based on knowledge
- b. with logical information processing prevailing computational
- c. answering questions

**10. Knowledge-based systems:**

- a. neural networks
- b. text recognition systems
- c. expert systems
- d. application program smart packages

**11. Heuristic search is used in:**

- a. neural networks
- b. expert systems
- c. gaming systems

**12. Music generation systems can be catergorised as:**

- a. communication systems
- b. creative systems
- c. executive systems
- d. recognition systems
- e. robotics

**13. What does knowledge representation mean?**

- a. coding information in any formal language
- b. knowledge presented in C++
- c. knowledge presented in mathematics textbooks
- d. modeling expert knowledge

**13. Which of the definitions below are not models of knowledge representation?**

- a. production model
- b. frames
- c. simulation models
- d. semantic network

**14. Who invented the first neurocomputer?**

- a. W. McCulloch
- b. M. Minsky
- c. F. Rosenblatt

**15. Which problems cannot be solved by neural networks?**

- a. classification
- b. approximation
- c. content addressable memory
- d. routing
- e. controlling
- f. coding

**16. What is the name of the first expert system?**

- a. MACSYMA
- b. EMYCIN
- c. PROSPECTOR
- d. DENDRAL

**17. Which subsystems are included in decision support systems?**

- a. decision generation support system
- b. decision making support systems
- c. database control systems
- d. simulation modelling systems

**18. Which methods are used in decision support systems?**

- a. analytical hierarchical processes method
- b. decomposition of the main goal
- c. mathematical modeling
- d. analytical network processes method

**19. What are the architectures of decision support systems??**

- a. independent data marts
- b. dependent data marts
- c. three-level data storage
- d. single-level data storage

**Answer key:**

<b>Question</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Answer</b>	b	b	c	a	c	c	abe	ab	b	c
<b>Question</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>Answer</b>	a	b	a	a	c	e	d	ab	abd	acd

Maximum amount of points for the final test is 40. The points are calculated automatically by MAU LMS Moodle testing system. Students receive a «credit» for the test if they score a minimum of 20 points.

**3.3. Criteria and grading system of essays**

The topic of the essay, structure, content and design requirements are presented in the methodological guidelines to the discipline (module) and in the e-learning course at MAU LMS Moodle.

The topic of the essay is "Potential for applying artificial intelligence in professional engagement."

Points	Assessment criteria
8-10	The author expresses their own opinion (viewpoint, attitude) when exploring the topic. The topic is explored with theoretical background, explained, appropriate social science concepts are used. The author justifies their opinion based on the facts of life or personal experience.
5-7	The author expresses their own opinion (viewpoint, attitude) when exploring the topic. The topic is explored and appropriate social science concepts are used (no theoretical background or explanations are incorporated or clearly expressed). The author justifies their opinion based on the facts of life or personal experience.
2-4	The author expresses their own opinion (viewpoint, attitude) when exploring the topic; social science concepts are not used explicitly. The author justifies their opinion based on the facts of life or personal experience with no connection to theoretical background.
0-1	The author expresses their own opinion (viewpoint, attitude), but the topic is not fully explored. The author has little connection between opinion justification and exploring the topic.

#### 3.4. Criteria and grading system of class attendance

Students may receive 2 credit points per lecture or laboratory class for participation in class. Participation means the active engagement of a student in classroom activities. If a student attends classes with no active engagement in the process of learning, they receive 1 credit point per class.

The maximum for class attendance is 12 credit points.

#### 3.5. Criteria and grading system of lecture notes

Lecture notes are material students take down during lecture sessions.

For each lecture note a student can receive a maximum of 2 credit points:

- 2 points – notes fully cover the material of a lecture and submitted on time;
- 1 point – notes are submitted on time, but have gaps in the material; *or* not submitted on time;
- 0 points – notes are not submitted.

### **4. Criteria and grading system of the discipline (module) results during the interim assessment (credit)**

If the student receives a required amount of credit points according to the grading system, they get a credit.

Grade	Points	Assessment criteria
<i>Pass</i>	61 - 100	receives a required amount of credit points according to the grading system
<i>Fail</i>	less than 60	does not receive a required amount of credit points according to the grading system

### **5. Diagnostic tasks for the assessment of educational results in the discipline (module) within the framework of internal and external independent assessment of the quality of education**

Assessment materials contains tasks for assessing knowledge, skills and abilities that demonstrate the level of competence mastery and indicators of their mastery.

The set of tasks is designed so as to assess each competence in written form.

The set of tasks includes: *a test*.

## A set of tasks

<b><i>YK-1 Can design action plans and apply systematic approach to critical analysis of problem situations</i></b>	
1.	<p>"Supervised learning" task category is so named because:</p> <p>A. a person trains a machine to solve a problem;            B. a machine receives data-based training;  <b>C. there is labeled data with the value of the goal variable</b></p>
2.	<p>How do such fields of artificial intelligence as machine learning and deep learning relate?</p> <p>A. these fields do not overlap;  <b>B. deep learning is a part of machine learning;</b>            C. machine learning is a part of deep learning;</p>
3.	<p>A task which requires to predict a categorical response on the basis on various characteristics, i.e., predict a number for each object, is a task of:</p> <p><b>A. regression;</b>            B. classification;            C. clustering;</p>
4.	<p>A task which requires to divide objects into groups of similar objects is a task of:</p> <p>A. regression;            B. classification;  <b>C. clustering;</b></p>
5.	<p>In a task of searching for association rules the number of cases when a combination of items occurred in a transaction divided by the total number of transactions is called:</p> <p>A. belief;  <b>B. support</b></p>
6.	<p>A task of identifying the smartphone owner by photo (actual owner or non-owner) refers to the task of:</p> <p>A. image detection  <b>B. image classification</b>            C. image segmentation</p>
<b><i>OIK-10 Can understand the principles of modern information technologies operation and use them to address tasks within professional engagement.</i></b>	
7.	<p>Main features of neural networks are:</p> <p><b>A. the ability to generalize and classify data</b>            B. sequential data processing            C. similarity with the neural processes of the human brain  <b>D. the ability for supervised and unsupervised learning</b></p>
8.	<p>A transition element having a certain number of inputs (synapses) which receive input signals, and one output (axon) which sends the output signal, is called _____ (<b>neuron</b>).</p>
9.	<p>The main task of a GPT neural network is:</p> <p>A. give correct answers to any user's question  <b>B. generate an answer to a question similar to the answer of a person</b>            C. find new information at the user's request</p>
10.	<p>A user's request to a neural network is called _____ (<b>prompt</b>).</p>
11.	<p>What ways can improve requests to a neural network:</p> <p><b>A. ask to justify the answer</b>            B. use general rules for making search queries  <b>C. ask to compare the answers</b>            D. ask for the most correct answer</p>
12.	<p>Choose the correct statement:</p> <p>A. a GPT neural network always gives an accurate and correct answer            B. a neural network answer cannot contain links to the sources of information used  <b>C. GPT neural networks have two stages of learning: first comes unsupervised, then supervised learning.</b></p>