Appendix 1

Ministry of Science and Higher Education of the Russian Federation
NATIONAL RESEARCH
TOMSK STATE UNIVERSITY (NR TSU)

Institute of Applied Mathematics and Computer Science

APPROVE
Director of the Institute of Applied
Mathematics and Computer Science
_______________ A.V. Zamyatin
«16» 05 2022

Evaluation materials of the current control and intermediate certification in the discipline
(Evaluation tools by discipline)
Intelligent Systems – II

in the major of training
01.04.02 Applied mathematics and informatics

Orientation (profile) of training:
Big Data and Data Science

Tomsk – 2022

ET was implemented:
Dr. tech. sciences, Professor,
Professor of the Department of Theoretical Foundations of Informatics — V.G. Spitsyn

Reviewer:
Dr. tech. sciences, Professor,
Head of the Department of Applied Informatics — S.P. Sushchenko

Evalution tools were approved at the meeting of the educational and methodological commission of the Institute of Applied Mathematics and Computer Science (EMC IAMCS).

Protocol dated 12.05.2022 № 4

Charmain of the EMC IAMCS,
Dr. tech. sciences, Professor — S.P. Sushchenko

Evaluation tools (ET) are an element of the system for assessing the formation of competencies among students in general or at a certain stage of its formation.

The ET is developed in accordance with the work program (WP) of the discipline.

1. Competencies and training outcomes, obtained upon the discipline mastery

Competencies	Competence indicator	Code and name of planned training outcomes that characterize the stages of competency formation	Criteria for evaluating training outcomes	
			Credit	Not credited
UK-1. Able to carry out a critical analysis of problem situations based on a systematic approach, develop an action strategy	IUK-1.1 Identifies a problem situation, on the basis of a systematic approach, carries out its multifactorial analysis and diagnostics. IUK-1.2 Carries out the search, selection and systematization of information to determine alternative options for strategic solutions in a problem situation.	MR-1.1.1. The student will be able to: - find and use sources of additional information to improve the level of general and professional knowledge; - to select and process information on the chosen research topic; correctly quote and make references to the sources used in written works; - be able to apply natural science and mathematical knowledge to solve scientific and engineering problems in the field of informatics and computer technology.	55-100 points	0-54 points

	IUK-1.3 Suggests and justifies the strategy of action, taking into account the limitations, risks and possible consequences.			
GPC-1. Able to solve actual problems of fundamental and applied mathematics.	IGPC -1.1 Analyzes problems in the field of fundamental and applied mathematics.	MR-1.1.2. The student will be able to: - develop means of implementing information technologies (methodological, informational, mathematical, algorithmic, technical and software) - to conduct experimental studies according to a given methodology and analyze the results. - perform processing and analysis of data obtained in theoretical and experimental studies.		

2. Stages of competency formation and types of evaluation tools

№	Stages of competency formation (discipline sections)	Code and name of training outcomes	Type of evaluation tool (tests, assignments, cases, questions, etc.)
1.	Sections 6. Genetic algorithm. 7. Setting the parameters of the genetic algorithm.	RD 1 The student will be able to apply natural science and mathematical solutions to scientific and engineering problems in the field of informatics and computer technology.	Tests, questions for colloquia, assignments for laboratory work
2.	8. Artificial neural networks. 9. Practical application of artificial neural networks.	RD 2 The student will have the ability to develop means of implementing information technologies (methodological, informational, mathematical, algorithmic, technical and software)	Tests, questions for colloquia, assignments for laboratory work

3. Typical control tasks or other materials necessary for the assessment of educational training outcomes

3.1. Typical tasks for conducting ongoing monitoring of progress in the discipline: tests, questions for colloquia, assignments for laboratory work.

3.2. Typical tasks for conducting intermediate certification in the discipline.

Questions for credit:

1. Give a flowchart of the genetic algorithm.
2. Describe the concepts of integer and real coding.
3. Describe how the one-point, two-point, and uniform crossover operators work for integer encoding.
4. Describe the principle of two-point, arithmetic and BLX crossover operators for real coding.
5. Give a block diagram of the functioning of a formal neuron.
6. Describe the types of neuron activation functions.
7. Describe the 4 rules for representing knowledge in a neural network.
8. Describe learning based on error correction.
9. Describe supervised learning of a neural network.
10. Describe reinforcement learning for a neural network.
11. Give a block diagram for solving the system identification problem and describe the principles of its functioning.
12. Describe the error backpropagation algorithm.

4. Methodological materials that determine the procedures for evaluating training outcomes

4.1. Methodological materials for assessing the current control of progress in the discipline.

The current control takes into account the student's performance of laboratory work and answers to questions at colloquia. The points scored on a 100-point scale are taken into account during the intermediate certification.

4.2. Methodological materials for conducting intermediate certification in the discipline.

The results of the test are determined by the marks “passed”, “not passed”.

The points scored during the current control are taken into account during the intermediate certification. The grades "passed" and "failed" are given with the number of points scored: 55-100 and 0-54, respectively.