RTU Course "Introduction to Artificial Intelligence"

02C60 null

General data

Code	BS0028
Course title	Introduction to Artificial Intelligence
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Jānis Lazovskis
Volume of the course: parts and credits points	1 part, 8.0 credits
Language of instruction	EN
Annotation	Artificial intelligence is a branch of computer science that studies the intelligent behaviour, training, and adaptation of machines. It is the ability of a system to correctly interpret external data, learn from such data and use this knowledge to achieve specific goals and objectives through flexible adaptation. As a result, artificial intelligence will often be aware of both important ethical issues and practical discoveries.
Goals and objectives of the course in terms of competences and skills	The aim of the course is to provide theoretical knowledge and practical skills to understand the basics of artificial intelligence, as well as to integrate these topics into a common perspective and provide practical skills in solving AI problems through programming tasks. The tasks of the course: - to teach to solve problems with artificial intelligence; - to teach to perform several tasks with artificial intelligence; - to improve the ability to allow computers to perform intellectual tasks such as decision making, problem solving, perception, understanding of human communication (in any language and translation between them).
Structure and tasks of independent studies	Students independently analyse the study course literature, prepare for tests. Independently develops projects, programs and prepares homework.
Recommended literature	Obligātā/Obligatory: Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th edition, 2020, 1136 p. Life 3.0 Book by Max Tegmark. 2017, 280 p. Human Compatible by Stuart J. Russell, 2019, 352 p. A Thousand Brains: A New Theory of Intelligence by Jeff Hawkins, 2021, 244 p.
Course prerequisites	Intro to Computer Science.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction.	6	6	0	0
Linear classifiers, separability, perceptron algorithm.	5	5	0	0
Maximum margin hyperplane, loss, regularization.	9	7	0	0
Stochastic gradient descent, over-fitting, generalization.	4	5	0	0
Linear regression.	5	9	0	0
Recommender problems, collaborative filtering.	6	8	0	0
Non-linear classification, kernels.	8	5	0	0
Learning features, Neural networks.	6	4	0	0
Recurrent neural networks.	9	5	0	0
Generalization, complexity, VC-dimension.	8	7	0	0
Unsupervised learning: clustering.	8	5	0	0
Generative models, mixtures.	6	7	0	0
Mixtures and the EM algorithm.	5	8	0	0
Learning to control: Reinforcement learning.	5	9	0	0
Reinforcement learning continued.	5	6	0	0
Applications: Natural Language Processing.	5	4	0	0
Total:	100	100	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Understands principles behind machine learning problems such as classification, regression, clustering, and reinforcement learning.	Weekly tests, programming tasks, midterm exam, final exam.
Is able to implement and analyse models such as linear models, kernel machines, neural networks, and graphical models.	Weekly tests, programming tasks, midterm exam, final exam.

Is able to choose suitable models for different applications.	Weekly tests, programming tasks, midterm exam, final exam.
Is able to implement and organize machine learning projects, from training, validation, parameter tuning, to feature engineering.	Weekly tests, programming tasks, midterm exam, final exam.

Evaluation criteria of study results

Criterion	%
Weekly tests	15
Programming tasks	30
Midterm exam	20
Final exam	35
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	8.0	40.0	60.0	0.0		*	