VIDZEMES AUGSTSKOLA

FACULTY OF ENGINEERING
STUDY COURSE DESCRIPTION

Course Title:	**INTRODUCTION TO MACHINE LEARNING AND NEURAL NETWORKS**				
Course code (VAIS):	**DatZ6004**				
Study programme:	**Virtual Reality and Smart Technologies**				
Level of Study programme:	☐ 1st level professional higher education				
	☐ Professional Bachelor				
	☒ Professional Master				
	☐ PhD level				
Type of Study programme:	☒ Compulsory course (Part A)				
	☐ Professional specialization courses (Part B, compulsory)				
	☐ Professional specialization optional courses (Part B, optional)				
	☐ Elective courses (Part C)				
Course Workload:	**Credits**	**ECTS**	**Academic hours**	**Contact hours**	**Independent work hours**
	2	3	80	24	56
Course Author/ Tutor:	**Sarma Cakula**				
	Prof. Ph.D.				
	Sarma.cakula@va.lv				
	Consultation: according to the schedule for each semester				
Course Form:	Full time				
Study year, semester:	1st year, 2nd semester				
Language:	Latvian, English				
Prerequisites for the Course:	-				
Course Summary:	The aim of this course is to give practical and theoretical knowledge about the basic principles of machine-learning, to give introduction for the most popular machine-learning algorithms and their use cases, as well as, provide an insight into artificial neural networks, their structure and use cases. The students will gain practical skills by developing a course project that will use an artificial neural network to solve a practical problem.				
Course Methods:	Lectures, practical activities, workshops, theory tests, final assessment etc.				
Assessment:	Final group project				
Requirements for Credits:	1. Passed each lecture's practical activity 2. Passed practical test 3. Completed final group assignment The final grade is comprised in the following way: 20% from the practical activities during lectures, 30% from the practical test and 50% from the final group project. If all requirements are not met on time, student is not allowed to pass the exam. For delayed exam requirements, max score is decreased.				
Course Contents:	Machine-learning. Machine-learning theory and approaches. Decision tree. Support Vector Machines. Deep Learning. Artificial Neural Networks. Structure of artificial neural networks. Perceptron. Teaching an artificial neural network. Convoluted artificial neural networks. Back-propagational artificial neural networks. Practical application of artificial neural networks and ethics of such use. Frameworks for artificial neural networks, their application and how to use them.				
Learning Outcomes; the evaluation methods and criteria	**Learning Outcomes**			**The evaluation methods and criteria**	
	Knowledge				
	Knowledge about machine-learning, application and approaches.			Classroom test.	
	Knowledge about artificial neural networks,			Classroom test.	

	their structure and learning.	
	Knowledge about convoluted neural networks, their structure and use.	Classroom test.
	Knowledge about back-propagational neural networks, their structure and use.	Classroom test.
	Skills	
	Skills to choose appropriate machine-learning algorithm for problems.	Completed workshop.
	Skills to train and configure artificial neural networks.	Completed workshop.
	Competency	
	Use an artificial neural network framework to solve a practical problem.	Submitted group project.
Course Compulsory literature:	Neural Networks and Deep Learning - http://neuralnetworksanddeeplearning.com/index.html	
Course additional literature:	-	
Course confirmation date:	08.12.2017.	
Date of course description update:		

Study Course Plan:

Date	Theme	Academic hours		Study Form
		Contact hours	Independent work hours	
	Introduction to machine-learning. Machine-learning theory and approaches.	4	8	Theoretical lecture. Classroom test.
	Artificial intelligence. Decision tree. Support Vector Machines. Deep learning and artificial neural networks.	4	8	Theoretical lecture. Classroom test.
	Structure of artificial neural networks. Teaching an artificial neural network. Perceptron.	4	8	Theoretical lecture. Classroom test.
	Convoluted neural networks. Back-propagational neural networks.	4	8	Theoretical lecture. Classroom test.
	Use of artificial neural networks for practical applications. Ethical responsibilities of the use of such data.	4	12	Theoretical lecture.
	Artificial neural network frameworks and their applications. Tensorflow.	4	12	Theoretical lecture. Workshop. Preparation for final group project.
	Total:	***24***	***56***	