

**ROBOTICS AND INTELLIGENT SYSTEMS
COURSE SYLLABUS**

Course Details				
Code	Academic Year			Semester
RIS522	1			2
Title	T	A	L	ECTS
Deep Learning and Classification Techniques	2	2	0	7
Language	English			
Level	Undergraduate		Graduate	X
Department / Program	Robotics and Intelligent Systems			
Forms of Teaching and Learning				
Course Type	Compulsory		Elective	X
Objectives	To comprehend deep learning techniques for the big data acquired by means of big data systems.			
Content	Supervised and unsupervised learning, introduction to deep learning and ANN; comparing NN to classical regression models; Activation functions, ReLU; Deeper networks, Multilayer neural networks; Forward and backpropagation, weight update affecting accuracy; Building deep learning models; Specifying a model, compiling the model, classification models; Non-linear classification; Deep learning models in keras: modeling, optimization, adding layers to a network; Data Preparation: Feature Engineering, Dimension reduction, PCA, clustering with k-means; CNN & RNN, principles of Generative Adversarial Network; Implementations of DL			
Prerequisites	Recommended: Machine Learning, Intelligent Systems			
Coordinator	Assist. Prof. Dr. Dilek Göksel Duru			
Lecturer(s)	Assist. Prof. Dr. Dilek Göksel Duru			
Assistant(s)				
Work Placement				
Recommended or Required Reading				
Books / Lecture Notes	<ul style="list-style-type: none"> - Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, Buzdağı Yayınevi, 2018. - Deep Learning with Python, François Chollet, Manning, 2018. - Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019. 			
Other Sources	<ul style="list-style-type: none"> - Artificial Intelligence: A Modern Approach, S. Russel und P. Norvig, Prentice Hall, Englewood Cliffs, 2003. - Maschine Learning, Tom Mitchell, McGraw-Hill, 1997. - Deep Learning with TensorFlow 2 and Keras: Regression, ConvNets, GANs, RNNs, NLP, and more with TensorFlow 2 and the Keras API, Antonio Gulli, Amita Kapoor, Sujit Pal, Packt Publishing, 2019. 			
Additional Course Material				
Documents	-			
Assignments	-			

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Exams	-		
Course Composition			
Mathematics und Basic Sciences	30		%
Engineering			%
Engineering Design			%
Social Sciences			%
Educational Sciences			%
Natural Sciences			%
Health Sciences			%
Expert Knowledge	70		%
Assessment			
Activity	Count		Percentage (%)
Midterm Exam	1		40
Quiz			
Assignments	1		10
Attendance			
Recitations			
Projects			
Final Exam	1		50
		Total	100
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	8	112
Assignments	10	5	50
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	224
		ECTS Points (Total Work Load / Hour)	8
Learning Outcomes			
1	Identify machine learning model design		

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2	Apply deep learning for classification
3	Be capable of confidently applying common techniques and algorithms in building intelligent systems.
4	Implement Tensorflow-Keras and apply advanced machine learning models to perform sentiment analysis
5	Carries out the applications in the field independently

Weekly Content

1	Basics of deep learning and artificial neural nets
2	Supervised vs unsupervised learning, comparing NN to classical regression models
3	Activation functions, ReLU
4	Deeper networks, Multilayer neural networks
5	Forward and backpropagation, weight update affecting accuracy
6	Building deep learning models
7	Specifying a model, compiling the model, classification models
8	Non-linear classification
9	Deep learning models in keras: modeling, optimization, adding layers to a network
10	Data Preparation: Feature Engineering, Dimension reduction, PCA, clustering with k-means
11	Convolutional Neural Networks
12	Recurrent Neural Networks
13	CNN & RNN, principles of Generative Adversarial Network
14	Implementations of DL

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3
1	5	5	4
2	5	5	4
3	5	5	4
4	5	5	4
5	5	5	4

Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

Compiled by: Assist. Prof. Dr. Dilek Göksel Duru

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