Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ISI 522	Artificial Neural Networks	2	3	0	0	3	6

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Elective
Course Level	Masters Degree
Objective	The aim of this course is to introduce artificial neural networks and discuss the basic ideas behind machine learning; present the concept of perceptron as a simple computing element and consider the perceptron learning rule; to introduce recurrent neural networks; explore Hebbian and competitive learning. Moreover, hybrid intelligent systems as a combination of different intelligent technologies will be introduced and evolutionary neural networks and fuzzy evolutionary systems will be discussed.
Content	 week: Introduction to knowledge-base intelligent systems week: Rule-based expert systems week: Uncertainty management in rule-based expert systems week: Fuzzy expert systems: Fuzzy logic week: Frame-based expert systems week: Artificial neural networks: Supervised learning week: Artificial neural networks: Unsupervised learning week: Evolutionary Computation: Genetic algorithms week: Mid term week: Evolutionary Computation: Evolution strategies and genetic programming week: Hybrid intelligent systems: Neural expert systems and neuro-fuzzy systems week: Hybrid intelligent systems: Evolutionary neural networks and fuzzy evolutionary systems week: Knowledge engineering: Building neural network based systems week: Data mining and knowledge discovery
References	Negnevitsky, M., Artificial Intelligence: A Guide to Intelligent Systems, Second Edition, Addison Wesley, 2004.

Theory Topics

Week	Weekly Contents
1	Introduction, Artificial Intelligence, Machine Learning
2	Linear Algebra Review
3	Linear regression with one variable and with multiple variables
4	Logistic regression with one variable and with multiple variables
5	Regularization
6	Neuron models and basic learning rules
7	Multi-layer perceptron
8	Midterm Examination
9	Different architectures
10	Associative memory and Hopfield Neural Network

Week	Weekly Contents	
11	Distance Based Neural Networks I	
12	Distance Based Neural Networks II	
13	Neural Network Trees	
14	Clustering	