Course Specifications

General Information

Course name	Neural Networks
Course number	ITCS5331
Faculty	
Department	
Course type	Major Needs
Course level	5
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - Enrich the student knowledge about Neuron model and network architcture
2 - Understand perceptron learning rule
3 - Understand Widrow-Hoff Learning
4 - Enrich the student knowledge about Associative Learning
5 - Understand Supervised Hebbian Learning
6 - Enrich the student knowledge about performance Optimization echniques
7 - Understand Competitive Networks
8 - Enrich student knowledge about backpropagation

Intended Learning Outcomes

Knowledge and Understanding	* a1) List different Neural Network architectures * a2) Explain different Neural Networks learning rules * a3) Apply Different Neural Network approaches in some pattern recognition and classification problems * a4) Identify mathematical concepts of performance optimization techniques
Intellectual Skills	* b1) Analyze different problems * b2) Analyze and compare different algorithms
Professional Skills	* c1) Use Neural Networks in solving problems in different fields
General Skill	* d1) Share ideas and work in a team

Course Contents

1 - Introduction
2 - Neuron Model and Network Architectures, An Illustrative Example
3 - Perceptron Learning Rule
4 - Background on Linear Algebra, Background on performance, surfaces and optimization, Widrow-Hoff Learning
5 - Backpropagation
6 - Supervised Hebbian Learning
7 - Associative Learning
8 - Competitive Networks

Teaching and Learning Methods

1 - Lectures
2 - Tutorial Exercises
3 - Projects

Teaching and Learning Methods for the Disabled Students

1 - ----

Students Assessment

Assessment Method	TIME	MARKS
Mid-Term Exam I	6th week	20
Project and/or Assignments	12th week	20
Class Work	During the 16 weeks	10
Final exam	16th week	50

Books and References

Course note	Lecture Course Notes
Essential books	M. Hagan, H. Demuth and M. Beale, Neural Network Design. PWS Publishing Company, 2009.
Recommended books	Robert J. Schalkoff. Artificial Neural Networks,co -published by MIT Press and the McGraw-Hill Companies, 2007
	K. Mehrotra, C. Mohan, and S. Ranka. Elements of Artificial Neural Networks. MIT Press, 2007.

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
Introduction	1	a1			
Neuron Model and Network Architectures, An Illustrative Example	2-3		b1		
Perceptron Learning Rule	4-5	a2			
Background on Linear Algebra, Background on performance surfaces and optimization, Widrow-Hoff Learning	6-9	a2			
Backpropagation	10-11				d1
Supervised Hebbian Learning	12-13	a2		c1	
Associative Learning	14	a2	b2	c1	
Competitive Networks	15	a3, a4	b1, b2		d1