UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
COMP-407	Neural Networks	6
Prerequisites	**Department**	**Semester**
MATH-280 COMP-201	Computer Science	Fall
Type of Course	**Field**	**Language of Instruction**
Elective	Computer Science	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Prof. Athena Stassopoulou	3rd or 4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face to Face	N/A	None

Course Objectives:

To provide an introduction to the fundamental principles of neural networks. It is designed to develop an understanding of the basic issues associated with the field such as: main neural network architectures, learning algorithms and neural network applications.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. describe the relation between biological and artificial neural networks and discuss current applications of artificial neural networks
2. explain the structure of single-layer perceptrons, learning algorithms, and their limitations
3. explain and contrast back-propagation networks (multi-layer perceptrons) to single-layer perceptrons
4. discuss applications of multi-layer perceptrons
5. explain the architecture of Radial Basis Function Networks, their learning algorithms and contrast to back-propagation networks
6. explain the architecture of the Hopfield model, its learning algorithm and its applications to pattern recognition
7. explain the structure of the Kohonen self-organizing map, its learning algorithm and its applications to machine vision and speech recognition
8. compare and contrast the various Artificial Neural Network architectures and learning

algorithms presented throughout the course

Course Content:

1. What is a neural network? Biological neural networks and artificial neural networks, their similarities and differences. History of neural networks and current applications.
2. Fundamentals of learning and training samples, supervised and unsupervised learning.
3. Single Layer Perceptrons: architecture, activation function, learning rule, convergence theorem, limitations.
4. Multi-layer Perceptrons: hidden units, Back-propagation (generalized delta) learning rule, applications.
5. Radial Basis Function Networks: architecture, learning, differences with multi-layer perceptrons.
6. The Hopfield model: architecture, learning algorithm, applications to character recognition.
7. Self-Organizing Maps (SOMs): structure of the Kohonen self-organizing map, learning algorithm, applications.

Learning Activities and Teaching Methods:

Lectures, Practical Exercises and Assignments

Assessment Methods:

Mid-term exam, Projects, Assignments, Final Exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Neural Networks and Learning Machines (3rd ed.)	Simon O. Haykin	Prentice Hall	2008	0131471392

Recommended Textbooks/Reading:

Title	Author(s)	Publisher	Year	ISBN
An Introduction to Neural Networks	Kevin Gurney	CRC press	1997	1857285034

Fundamentals of Neural Networks: Architectures, Algorithms And Applications	Laurene V. Fausett	Prentice Hall	1994	0133341860