COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Computer Science		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	614SKEC	**SEMESTER**	6
COURSE TITLE	NEURAL NETWORKS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	5
Tutorial Exercises	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialized general knowledge
PREREQUISITE COURSES:	Scientific Computing
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The purpose of the course is to introduce the student to the concept of Artificial Neural Networks and Machine Learning which is their main field of application.
The student must know the various things their types, their structure and applications, as well as their performance limits and be able to use Neural Network simulation software and create applications.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Project planning and management
Respect for difference and multiculturalism

Adapting to new situations *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous work
- Team work
- Work in an international environment
- Promotion of free, creative and inductive thinking

(3) SYLLABUS

- Basic concepts
- Artificial Neural Networks
- The Perceptron and ADALINE networks
- The Multi-Layer Perceptron Network and the Back-Propagation Rule
- Self-organizing networks (SOM)
- Radial Basis Function (RBF) Networks
- Hebbian learning models
- Implementation of Neural Networks in Matlab
- Learning and Generalization
- Support Vector Machines
- Statistical Models and Bayes' Rule
- Learning Probability Distributions and Clustering
- Deep Learning

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Website of the course with supporting and auxiliary material. Communication software with students through the e-class electronic platform to share course announcements, notes and exercises.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	26x2=52
Tutorial Exercises: Selected, representative exercises are solved concerning different modules of the course.	13x2=26
Written Exams	13x1=13
Individual Study	170 x 0,2 = 34
Course total	***125***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	**Theory** Final written exam (100%) which includes:

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	• Theoretical test questions • Problem solving Or Project (100%) implementing a Neural Network

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

- Νευρωνικά δίκτυα και μηχανική μάθηση. Haykin, Simon. Εκδόσεις Παπασωτηρίου, ISBN13: 9789607182647
- Neural Network Design. Martin T. Hagan, Howard B. Demuth, Mark Hudson Beale, Orlando De Jesús. ISBN13: 9780971732117. https://hagan.okstate.edu/NNDesign.pdf
- Τεχνητά νευρωνικά δίκτυα. Κωνσταντίνου Διαμαντάρα. Εκδόσεις Κλειδάριθμος, ISBN : 978-960-461-080-8
- Neural Network Toolbox (Matlab). Mark Hudson Beale, Martin T. Hagan, Howard B. Demuth.