1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
LEVEL OF STUDIES	UNDER GRADUATE		
COURSE CODE	**4109**	**SEMESTER**	**9th**
COURSE TITLE	**MACHINE LEARNING**		
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		**3**	**6**
Laboratory			
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*	Specialised general knowledge		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK/ENGLISH		
COURSE DELIVERED TO ERASMUS STUDENTS	YES		
MODULE WEB PAGE (URL)	https://eclass.uowm.gr/courses/MRE267		

2. LEARNING OUTCOMES

Learning outcomes
Machine Learning is a subfield of Artificial Intelligence related to the ability of computers to learn and act without being explicitly programmed. The study and construction of algorithms that can draw conclusions from a variety of data and make predictions related to them is the main object of investigation in this field. It is closely related to concepts from Statistics, Probability Theory and Optimization. With the abundance of data that exists in our time due to the internet and the World Wide Web, the appropriate environment is provided for the application and evaluation of machine learning algorithms and related applications are search engines, computational vision, natural language processing, recognition of user behavior patterns. in a social network, autonomous vehicles and more generally autonomous interactive systems. The aim of the course is to present the concepts and basic elements of Machine Learning (neural networks, deep learning, decision trees, categorical logic, Bayesian networks, genetic algorithms, etc.) and students' understanding of the importance and prospects it offers. this space. Upon successful completion of the course, the student should be able to: • Understand the basic concepts of Machine Learning.

- Describe the basic types of learning (with or without supervision, with reinforcement)
- To categorize the most important models of machine learning.
- Describe the operation of the most basic machine learning models.
- To give examples of application of machine learning models (processing of standards, autonomous vehicles, processing of speech, signal and image, development of strategy in games, etc.)

General Skills

- **Theoretical and practical background concerning the cognitive field of Machine Learning.**
- **Understand data analysis models and associate them with application requirements.**

3. COURSE CONTENTS

- Introductory concepts
- Supervised learning
- Computational classification methods
- Neural networks
- Support vector machines
- Deep learning models
- Stochastic methods
- Bayesian neural networks
- Retrospective neural networks
- Estimation of probability distributions and clustering
- Analysis of main components
- Analysis of independent components
- Learning with reinforcement
- Elements of linear algebra
- Optimization

4. TEACHING METHODS - ASSESSMENT

MODE OFDELIVERY	1. THEORY In class, face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	● Use of appropriate software ● Video and slide presentations via projector ● Support of teaching process via the electronic platform e-class
TEACHING METHODS	

Activity	*Semester workload*
Lectures	50
Homework	50
Non-directed study	50
Course total	**150**

ASSESSMENT METHODS	1. (60%) Final written exam which includes: i. Short-answer questions ii. Multiple choice questions

	iii. Problem solving 2. (40%) Homework

5. ATTACHED

- Suggested bibliography:

- **Μηχανική Μάθηση, Διαμαντάρας Κ, Μπότσης Α. Δημήτρης, εκδόσεις Κλειδάριθμος, 2019**
- **Python Deep Learning, "Exploring deep learning techniques and neural network architectures with PyTorch, Keras and TensorFlow" I.Vasilev, D.Slater, G.Spacagna, P.Roelants, V.Zocca, 2nd ed, Packt, 2019**