INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	GRADUATE						
COURSE TITLE	**Machine Learning**						
COURSE CODE	**C29**		**Semester**	**2**	**ECTS**	**6**	
TEACHING HOURS per week	**THEORY**	**2**	**SEMINAR.**	**1**	**LABORATORY**	**0**	
URL	https://eclass.uoa.gr/courses/DI535/						

COURSE CONTENT
The course introduces the graduate student to the mathematical concepts as well as to algorithmic techniques and computational tools in the scientific field of machine learning. More specifically, the course provides an overview of the basic supervised learning methods, namely, regression and classification models as well as non-supervised learning models that include clustering, matrix factorization, and latent semantic indexing algorithms. Following the rapid developments in the field of machine learning, modern methodologies and deep neural network architectures will also be presented. The above subjects are presented through theory lectures and practical laboratory exercises in Python programming language. The majority of the examples and applications that will be discussed within the context of the course stem from the natural processing domain and computer vision.

STUDENT LEARNING OBJECTIVES
Upon successful completion of the course the student will be able to: • describe the basic regression, classification and clustering algorithms • utilize methods for dimensionality reduction and feature selection • design and train deep learning models • use machine learning libraries in Python for solving real-world learning problems

TEACHING AND LEARNING METHODS - ASSESSMENT	
TEACHING METHOD	Both live transmission and in-situ lectures
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform - Material Provision - Announcements - Coursework/Homework assignment - Email communication
TEACHING ORGANIZATION *Describe in detail the way and methods of teaching:* *Enhanced Lectures,* *Online Lectures,* *Seminars,* *Tutorial,* *Laboratory,*	**Activity** / ***Student Workload*** *(hours)* Lectures: 26 Laboratory: 13 Independent Study: 45

Laboratory Exercise, *Study & analysis of literature,* *Practice (Positioning),* *Interactive teaching,* *Developing a project,* *Individual / group work* *Telework (reference to tools) etc.* *Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS*	Courseworks: 66 ***Total Course (25 hours of workload per unit of credit)***: ***150***
ASSESSMENT OF STUDENTS *Description of the assessment process* *Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other* *Fully defined evaluation criteria are mentioned and if and where they are accessible to students.*	Describe explicitly methods, evaluation tools and provided feedback. The table below is supplemented accordingly.

Assessment methods	***Number***	***Percentage***
Written examination	1	30%
Courseworks - Homeworks	3-4	70%

LITERATURE AND STUDY MATERIALS / READING LIST

1. An Introduction to Statistical Learning with Applications in R, G. James, D. Witten, T. Hastie, and R. Tibshirani, Springer, 2017.
2. Pattern Recognition and Machine Learning, Ch. M. Bishop, Springer, 2006.
3. Deep Learning, I. Goodfellow, Y. Bengio and A. Courville, MIT Press, 2016
4. Machine Learning: A Bayesian and Optimization Perspective, S. Theodoridis, Elsevier (Academic Press), 2020.
5. Mathematics for Machine Learning, M.P. Deisenroth, A.A. Faisal, and Cheng Soon Ong, Cambridge University Press, 2020.
6. Coding the matrix, Linear Algebra through Computer Science Applications, Ph. Klein, Newtonian Press, 2013.