

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	6157	SEMESTER	7 th
COURSE TITLE	STSP: Methodological Tools of Machine Learning		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures		2	7
Workshops			
Labs		2	
COURSE TYPE	Elective		
PREREQUISITE COURSES:	No prerequisites are formally required, however basic knowledge of Linear Algebra, Calculus, Probability, Statistical Inference, and Stochastic processes will be useful		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat/content/methodological-tools-machine-learning-7		

(2) LEARNING OUTCOMES

Learning outcomes
Students will be able to: • Deeply understand the functions of fundamental methodological machine learning tools, both analytical and computational • Apply those tools to study real problems • Integrate them into developing new techniques
General Competences

(3) SYLLABUS

The course focuses on methodological tools of machine learning, such as: • Reproducing kernel Hilbert spaces and applications • Manifold learning, data geometry and applications • Universal approximation theorems and applications to deep learning

- Probability Theory in high dimensions
- Gaussian processes and applications to machine learning

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Eclass Email Use of Computer	
TEACHING METHODS	Activity	Semester workload
	Lectures	91
	Study & Analysis of the Bibliography	67
	Exercise/Project	17
	Course total	175
STUDENT PERFORMANCE EVALUATION	Project with presentation and/or final exam.	

(5) ATTACHED BIBLIOGRAPHY

- Hofmann, Thomas, Bernhard Schölkopf, and Alexander J. Smola. "A tutorial review of rkhs methods in machine learning." Technical Report (2005).
- Higham, Catherine F., and Desmond J. Higham. "Deep learning: An introduction for applied mathematicians." Siam review 61.4 (2019): 860-891.
- Calin, Ovidiu. Deep learning architectures. New York City: Springer International Publishing, 2020 Ch. 9
- Professors notes