COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY
ACADEMIC UNIT	DEPARTMENT OF STATISTICS
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)

COURSE CODE	6115	**SEMESTER**	6th

COURSE TITLE	**Numerical Methods in Statistics**

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	7
Workshops		
Labs	2	

COURSE TYPE	Elective – Scientific Field
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat/content/numerical-methods-statistics-7-ects

(2) LEARNING OUTCOMES

Learning outcomes
At the end of the course the student will be able to understand the methodology, usage and limitations and will also be able to implement from first principles advanced numerical methods required for statistical science and machine learning.

Among others, the student will be able to identify and fully understand and implement the appropriate statistical method for the concrete problem at hand, program it from first principles in a high level programming environment (e.g. Python or R), and use it for understanding the particular concrete problem or model. |
| **General Competences** |
| Computing and scientific computing (Python or R)
Independent study of the scientific literature
Writing of scientific reports
Presentation and oral/written communication skills |

Collaboration skills

(3) SYLLABUS

Methodology and implementation of scientific computing methods for statistics and machine learning.
The course is structured along three fundamental pillars
(a) Numerical linear algebra
(b) Numerical optimization
(c) Approximation theory
All methods will be implemented computationally from first principles and tested on suitably selected problems from statistics and machine learning.

Knowledge of topics related to statistical inference, are very useful.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	YES

TEACHING METHODS	Activity	Semester workload
	Lectures	26
	Lab Exercise	26
	Studying and Analyzing Bibliography	10
	Project	60
	Assignment	30
	Self Study	23
	Course Total	**175**

STUDENT PERFORMANCE EVALUATION .	
	Home Assignment	30
	Project	50
	Public Presentation	20
	Exempt Assignment	100

Information is available at eclass

(5) ATTACHED BIBLIOGRAPHY

- Burden, R., Faires, J., (2010). Numerical Analysis. Cencage Learning.
- Chapra, S., Canale, R. (2016). Αριθμητικές Μέθοδοι για Μηχανικούς. Εκδόσεις Τζιόλα.
- Gentle, J. (2009). Στοιχεία Υπολογιστικής Στατιστικής. Εκδόσεις Παν. Μακεδονίας.
- Lange, K. (2010). Numerical Analysis for Statisticians. Springer.
- Monahan, J. F. (2011). Numerical methods of statistics. Cambridge University Press.

Lecture notes by the Professor

Research papers from the current literature for the more specialized topics on which the assignments will be based upon (provided by the Professor to the interested students)