COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	**6012**	**SEMESTER**	**4th**
COURSE TITLE	**Estimation and Hypothesis Testing - Recursive**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	8
Workshops	2	

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

(2) LEARNING OUTCOMES

Learning outcomes
After successfully completing the course, students will be able to estimate unknown parameters using the appropriate methodology, to construct confidence intervals containing the unknown parameter's value with the desired probability and to perform tests of statistical hypotheses in specific problems.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Adaptation to new situations • Decision-making • Generation of new research ideas • Project planning and management • Respect for diversity and multiculturalism • Respect for the natural environment • Demonstration of social, professional and ethical responsibility and sensitivity to gender issues • Exercise of criticism and self-criticism • Promotion of free, creative and inductive thinking

(3) SYLLABUS

Random sampling, statistics of random samples and their sampling distributions. Point estimation of parameters of a given statistical population based on random sample statistics, statistical properties of point estimators (consistency, unbiasedness, efficiency, sufficiency, asymptotic normality), methods of point estimation (Rao-Blackwell and Cramer-Rao methods for unbiased estimation of minimum variance, method of moments, method of least squares, method of maximum likelihood). Construction of confidence intervals (exact or asymptotic) for mean value, proportions, variance of a given population (normal or non-normal), as well as for the difference of mean values, the difference of proportions, the ratio of variances of two independent populations (normal or non-normal). Formulation of statistical hypotheses and their testing in the Neyman-Pearson framework, for single parameters such as mean values, proportions, variances, as well as for comparing such parameters in two independent populations. Error functions and power function of a test, statistical significance level, p-value, determination of sample size.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	**Teaching and Communicating with students: email and eclass**
TEACHING METHODS	

Activity	***Semester workload***
Class Lectures	52
Studying and analyzing bibliography	20
Tutorial	26
Self Study	102
Course Total	**200**

STUDENT PERFORMANCE EVALUATION	Written examination at the end of the semester Information is available at eclass

(5) ATTACHED BIBLIOGRAPHY

- Πανάρετος Ι., Ξεκαλάκη Ε. (2003) *Εισαγωγή στη Στατιστική Σκέψη - Τόμος ΙΙ*, 2η έκδοση, Εκδόσεις Μπένου.
- Ρούσσας Γ.Γ. (1994) *Στατιστική Συμπερασματολογία, Τόμος Ι- Εκτιμητική*, 2η έκδοση, Εκδόσεις Ζήτη.
- Ρούσσας Γ.Γ. (1992) *Στατιστική Συμπερασματολογία, Τόμος ΙΙ-Έλεγχος Υποθέσεων*, 2η έκδοση, Εκδόσεις Ζήτη.
- Roussas G.G. (2025) *An Introduction to Probability and Statistical Inference*, 3rd edition, Elsevier - Academic Press.
- Hogg R.V., Tanis E.A., Zimmerman D.L. (2020): *Probability and Statistical Inference*, 10th edition, Pearson Education Inc.
- Rohatgi V.K., Ehsanes Saleh A. K. Md. (2015) *An Introduction to Probability and Statistics*, 3rd edition, Wiley.
- Mood A.M, Graybill F.A., Boes D.C. (1974) *Introduction to the Theory of Statistics*, 3rd edition, McGraw-Hill Inc.
- Hoel P.G., Port S.C., Stone C.J. (1971) *Introduction to Statistical Theory*, Houghton Mifflin Company.