COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	**6113**	**SEMESTER**	**8th**
COURSE TITLE	**Non-Parametric Statistics**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	7
Workshops		
Labs	2	

COURSE TYPE	Elective – Scientific Field
PREREQUISITE COURSES:	Linear Algebra, Estimation – Hypothesis Testing, Linear Models, Generalized Linear Models
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat/content/non-parametric-statistics-7-ects

(2) LEARNING OUTCOMES

Learning outcomes
At the end of the course the student will be able to: Understand the non-parametric methods described and their properties. Apply these methods in real data analysis and correctly interpret the results.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Autonomous work • Promotion of free, creative and inductive thinking

(3) SYLLABUS

Empirical distribution function, empirical process, Kolmogorov –Smirnoff and similar tests. Statistics based on functional of the empirical distribution. Jacknife and Bootstrap: general principles, examples, parametric bootstrap, estimating parameter variance and bootstrap confidence intervals. Nonparametric tests

based on ranks and concepts of robustness and asymptotic relative efficiency. Nonparametric density estimation, histograms, Nadaraya-Watson and LOESS estimator: bias, variance, tradeoff between them and bandwidth choice: plug in and cross-validation methods. Nonparametric regression: smoothing techniques. Estimator based on kernels (Nadaraya-Watson), asymptotic development of bias and variance, bandwidth choice, local polynomial regression and splines, variance estimation and confidence intervals. Generalized additive models and regression trees.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td colspan="3">Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td colspan="3"><table>
<tr><td>In Teaching</td><td>Yes</td><td>Teaching with slides</td></tr>
<tr><td>In labs</td><td>Yes</td><td>Application Lab using R</td></tr>
<tr><td>In communicating with the students</td><td>Yes</td><td>eclass</td></tr>
</table></td></tr>
<tr><td>TEACHING METHODS</td><td colspan="3"><table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Tutorial</td><td>26</td></tr>
<tr><td>Assignment</td><td>70</td></tr>
<tr><td>Self Study</td><td>77</td></tr>
<tr><td>Course Total</td><td>175</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
.</td><td colspan="3">Written examination at the end of the semester
Bonus based on delivering assignments.
Information is available at eclass</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Α. Μπατσίδης, Π. Παπασταμούλης, Κ. Πετρόπουλος, Α. Ρακιτζής (2022). Μη Παραμετρική Στατιστική, Θεωρία και εφαρμογές με χρήση R και S.P.S.S., Κάλλιπος ανοιχτές ακαδημαϊκές εκδόσεις που είναι διαθέσιμο και σαν electronic resource στην http://dx.doi.org/10.57713/kallipos-102
- Κούτρας, Μ. και Τριανταφύλλου, Ι. (2022). Μη Παραμετρική Στατιστική, Θεωρία και Εφαρμογές, Εκδόσεις Τσότρας
- Efron and Tibshirani (1998), An Introduction to the Bootstrap. Chapman & Hall.
- Fan, J. and Gijbels, I. (1996). Local polynomial modelling and its applications. Chapman & Hall.
- Fox, J. (2000). Nonparametric Simple Regression: Smoothing Scatterplots. Sage Publications.
- Hajek, J. (1969). A Course in Nonparametric Statistics. Holden Day.
- Hastie, T. J. and Tibshirani, R. J. (1990). Generalized Additive Models. Chapman and Hall.
- Hettmansperger, T. and McKean, J. (2011). Robust nonparametric Statistical Methods. Boca Ration : CRC/Taylor & Francis.
- Higgins, J. J. (2004). Introduction to Modern Nonparametric Statistics. Thomson/Brooks/Cole, New York.
- Hollander, M. and Wolfe, D. A., (1999). Nonparametric Statistical Method. Wiley.
- Shao and Tu (1995), The Jackknife an the Bootstrap, Springer.
- Sidak, Z., Sen, P. K. and Hajek, J. (1999). Theory of Rank Tests. Academic Press.
- Silverman, B.W. (1986). Density Estimation for Statistics and Data Analysis. Chapman and Hall.
- Wand, M. P. and Jones, M. C. (1994). Kernel Smoothing. Chapman and Hall.

- Wasserman, L. (2006). All of Nonparametric Statistics. Springer.
- Wood, Generalized Additive Models. Chapman and Hall.