PRELIMINARY PROGRAM FOR
POSTGRADUATE STUDENTS OF THE PROGRAM
"M.Sc. in Statistics"
(full time)

WEEK 0 (*26/9/2022 – 30/9/2022*)

All lecture rooms are located at the Postgraduate Building of AUEB
(Address: Evelpidon 47A & Lefkados 33 str.)
6th floor (601) and 8th floor (802).

Monday 26/9/22: Probability – Prof. E. Kyriakidis, 9:00-13:00 (Room 601)

Tuesday 27/9/22: Introduction to R – Prof. I. Ntzoufras, 9:00-13:00 (Room 802)

Wednesday 28/9/22: Statistical Inference – Assoc. Prof. I. Vrontos, 9:00-13:00 (Room 601)

Thursday 29/9/22: Hypothesis Testing – Assist. Prof. N. Demiris, 09:00-13:00 (Room 802)

Friday 30/9/22: Linear Regression – Prof. V. Vasdekis, 09:00-13:00 (Room 601)

Syllabus

Introduction to R: Introduction to R (arrays, matrices, data frames, lists), data types (numerical, logical, character, categorical, ordinal), Basic mathematical and logical functions, Descriptive analysis and diagrams, Basic modelling commands, if/ else and for loops, Functions, R packages.

Probabilities: Recap of fundamental concepts (independency, conditional probabilities, Bayes theorem). Some basic distributions – Binomial – Polynomial, Hypergeometric – Multivariate – Poisson.

Estimation: Point Estimation, Properties of point estimators, Methods of point estimation – Method of moments – Least Squares method – Method of maximal probability – examples of applying these methods, Sample mean and sample variance. Sampling distributions.

Hypothesis Testing: Test definition, examples, statistical control function, acceptance and rejection areas. Critical point, possible mistakes in hypothesis testing, control power, types of statistical hypotheses, observed significance level, hypothesis testing for mean values and normal populations ratios, comparing mean values and normal population ratios, hypothesis testing for variances, calculating confidence intervals.

Linear Regression: What is linear regression, least squares estimation, t-tests, confidence intervals, defining multiple regression, linear model ANOVA, residual graphs, introduction to influential points, Cook distance.

Bibliography

Sheldon Ross (2010) A First Course in Probability (8th Edition) Hardcover Pearson.

Allan Gut (2009) An Intermediate Course in Probability, Springer

Douglas Montgomery (2014) Applied Statistics and Probability for Engineers,

6th Edition International Student Version. an older version

Venables W.N., Smith D. M. and the R Core Team (2013). An Introduction to R;

Verzani J. (2002). simpleR: Using R for Introductory Statistics, version 0.4;