

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	6108	SEMESTER	8th
COURSE TITLE	Categorical Data Analysis		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures		4	8
Workshops			
Labs			
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/categorical-data-analysis-8-ects		

(2) LEARNING OUTCOMES

Learning outcomes
At the end of the course, students are expected to know how to quantify different dependency forms between two or more categorical data, to control which form of dependency appears to apply to a particular set of data, to fit logistic regression models and to interpret the results of their data fit.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Decision making • Autonomous work • Teamwork

(3) SYLLABUS

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Introduction to categorical data analysis, binary data, multinomial data, contingency tables, joint and conditional probability, comparison of conditional probabilities, frequencies and probabilities, multinomial distribution, hypothesis testing with one sample from the binomial distribution, estimation of a binomial proportion, hypothesis testing for the difference of two binomial proportions, estimation of the difference of two binomial proportions, Delta method, relative risk and risk ratio (RR), distribution of RR, hypothesis testing about the RR, interval estimation about the RR, odds, odds ratio (OR), properties and inference about the OR, hypothesis testing about the OR, odds for more than two events, OR in $2 \times J$ tables, OR in $I \times J$ tables, sampling for categorical data (Poisson, multinomial, product multinomial sampling), types of observational studies (prospective, retrospective, cross-sectional), independence in contingency tables, chi-squared test of independence, test of independence with the method of maximum likelihood (G2 statistic), residuals for cells in a contingency table, partitioning of G2 statistic in $2 \times J$ and $I \times J$ contingency tables, ordinal variables, linear trend of ordinal variables, linear correlation, concordant-discordant pairs in contingency tables, gamma measure of association, small sample inference- Fisher exact test, contingency tables for matched observations, inference, estimation and hypothesis testing for matched data (McNemar's test), multi-dimensional tables, Simpson's paradox, conditional and marginal OR, independence models, independence tests using X^2 and G2 statistics, the Cochran-Mantel-Haenszel test, the Breslow-Day test, logistic regression: likelihood function, model interpretation, hypothesis testing, prediction, goodness-of-fit test, residuals, diagnostics, model selection.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	YES	
TEACHING METHODS	Activity	Semester workload
	Lectures	52
	Studying and Analyzing Bibliography	12
	Assignment	68
	Self Study	68
	Course Total	200
STUDENT PERFORMANCE EVALUATION	Written examination at the end of the semester: 80% Practical Exercises: 20% Information is available at eclass	

(5) ATTACHED BIBLIOGRAPHY

- Agresti A., (2013). Categorical data analysis, Wiley
- Agresti A., (2007). An Introduction to Categorical Data Analysis, Wiley.
- Hosmer, D., Lemeshow, S. and Sturdivant, R. (2013) Applied Logistic Regression, Wiley
- Kateri, M. (2014). Contingency Table Analysis, Springer.
- Fienberg, S. E. (2007). The Analysis of Cross-Classified Categorical Data (2nd ed.). Springer.