Syllabus

Course Description

Course Title	Statistics for PPE
Course Code	27055
Course Title Additional	
Scientific-Disciplinary Sector	STAT-01/A
Language	Italian
Degree Course	Bachelor in Economics, Politics and Ethics
Other Degree Courses (Loaned)	
Lecturers	Prof. Francesca Marta Lilja Di Lascio, Marta.DiLascio@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/32845 Dott. Marta Nai Ruscone, Marta.NaiRuscone@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/39746
Teaching Assistant	
Semester	First semester
Course Year/s	2
CP	8
Teaching Hours	48
Lab Hours	24
Individual Study Hours	-
Planned Office Hours	24
Contents Summary	This teaching falls within the scope of the statistical-mathematical subject area. The course aims to provide students with the basic concepts of descriptive statistics, the calculus of probability, statistical inference theory and the simple linear regression model, with applications in economics and the social sciences. During the course, R software will be used to perform descriptive and inferential analyses of real

	or simulated data.
Course Topics	Descriptive statistics Preliminary definitions. Classification of variables. Individual and frequency distributions. Graphical representations. Descriptive data analysis using measures of central tendency, position and variability. Calculation of probabilities Random events. Probability: definitions and axioms. Conditional probability and independence. Total probability theorem. Bayes' theorem. Discrete and continuous random variables. Probability and probability density functions. Distribution function. Expected value and variance. Some distributions for discrete random variables: uniform, Bernoulli, binomial and Poisson. Some distributions for continuous random variables: Gaussian, t-Student, Chi-square. Central limit theorem. Statistical inference Logic of statistical reasoning. Simple random sampling and the sample universe. Sample distributions of mean, variance and proportion. Sample statistics, estimators and their properties. Point estimates. Confidence intervals for mean, variance and proportion. Hypothesis tests. Type I and type II error. Significance level and p-value. Hypothesis tests for a mean and for a proportion. Correlation, dependency and regression models Contingency tables and measures of association. The chi-square test of independence. Bivariate analysis using correlation and regression. The inference of the simple linear regression model. R software Introduction to R software. Descriptive and inferential data analysis with R. Linear regression and inferential aspects in R.
Keywords	Data analysis, Descriptive statistics, Probability, Statistical inference, R software
Recommended Prerequisites	Notions of basic mathematics, e.g. functions, equations, limits,... and basic familiarity with computers.
Propaedeutic Courses	There are no prerequisites, but the Maths Preparation Course and the Maths for EPE course are strongly recommended.

Teaching Format	Lectures, tutorials, workshops.
Mandatory Attendance	Strongly recommended but not compulsory.
Specific Educational Objectives and Learning Outcomes	ILO (Intended Learning Outcomes) ILO 1 Knowledge and understanding ILO 1.1 knowledge of probabilistic and inferential tools to employ statistical models; ILO 1.2 ability to model social and economic phenomena; ILO 1.3 basic knowledge of data management and computer programming for statistical and econometric analysis of socio-economic data; ILO 1.4 knowledge of the technical vocabulary of the subjects in this learning area. ILO 2 Ability to apply knowledge and understanding: ILO 2.1 ability to construct and test simple statistical and econometric models; ILO 2.2 ability to deal with issues of statistical inference, make parameter estimates of probabilistic and statistical models and carry out statistical tests; ILO 2.3 ability to read, write and communicate in the technical language of quantitative methods in the three official languages of instruction ILO 3 Making judgements ILO 3.1 Acquisition of the capacity for judgement and of the methodological tools useful for the critical analysis of data, sources, assumptions and implications of scientific practice, of the political, ethical and legal context within which economic phenomena are set and with which they interact ILO 4 Communication skills ILO 4.1 Fluency (oral and written) in Italian, German and English, including translation between these languages. Intercultural competence. Conceptual awareness, synthesis and written expression, particularly in the drafting of scientific or science-based

	documents ILO 5 Learning skills ILO 5.1 Promotion of critical thinking and analytical skills to focus on complex problems in their long-term dynamics and the variety of their implications, including ethical ones
Specific Educational Objectives and Learning Outcomes (additional info.)	Knowledge and understanding: - Knowledge and understanding of descriptive statistics for univariate and bivariate data. Knowledge and understanding of basic probability. - Knowledge and understanding of logical reasoning for constructing sample distributions and the implications for statistical inference. - Knowledge of statistical language. - Ability to understand simple statistical models. - Ability to understand the philosophy and scientific principles of hypothesis testing. Ability to apply knowledge and understanding: - Ability to use quantitative methods to describe economic and social phenomena. - Ability to read, write and communicate in the language of statistics. - Ability to conduct simple data collection and statistical analysis using R software. - Ability to use statistical inference and the linear regression model in economic and social applications. - Ability to conduct hypothesis testing for various statistical problems. Making judgments: critically evaluate models and tools of statistical analysis. Communication skills: concisely presenting a statistical analysis. Learning skills: making connections between different statistical models.
Assessment	Written examination on statistical theory (exercises and theoretical

	questions) - (ILOs 1.1, 1.2, 1.4, 2-5) and on the statistical software R (questions on code and interpretation of outputs) - (ILOs 1.2, 1.3, 1.4, 2-5). A voluntary intermediate exam (ILOs 1-5) and a compulsory final exam (ILOs 1-5) will be provided. The grade for the intermediate examination may be refused, in which case a full final examination will be taken (ILOs 1-5). For all types of examinations, no textbooks, other teaching materials or any electronic devices are allowed in the examination room. Dictionaries without notes, simple calculators and an A4 sheet with formulas only are permitted. The specified examination method is valid for both attending and non-attending students.
Evaluation Criteria	The final grade will be a weighted average of the written intermediate exam (50%) and the written final exam (50%). Students who did not take the intermediate examination or refused their intermediate grade will receive a longer examination that will count for 100% of the final grade. In the intermediate, final and comprehensive examination, 70% of the grade will be related to statistical theory and exercises and 30% to the R software. The assessment criteria for the written examination of theory and exercises are: correctness and clarity of answers. The assessment criteria for the examination part relating to the R software are: the ability to interpret the output and to write the formal code correctly.
Required Readings	- S. Borra, A. Di Ciaccio, Statistics - methodologies for economic and social sciences, McGraw-Hill, Milan, 2020, 4th ed. ISBN: 978-88-386-9632-9. Chapters: 1-4, 6, 8-16. - F. Ieva, A.M. Paganoni, V. Vitelli, Laboratorio di Statistica con R. Eserciziario, Pearson, Milano, 2012. ISBN: 978-88-719-2762-6. - Lecture slides, lab R code and exercise batteries. .
Supplementary Readings	- A. Agresti, B. Finlay, Basic and Advanced Statistical Methods for the Social Sciences, Pearson, Milan, 2012. ISBN: 978-88-7192-945-3. - G. Espa, R. Micciolo, Problems and experiments in statistics with

	R, Apogeo, Milan, 2014. ISBN: 978-88-387-8610-5. .
Further Information	
Sustainable Development Goals (SDGs)	Partnerships fot the goals, Quality education