ECONOMICS AND FINANCE (LB06)

(Lecce - Università degli Studi)

Teaching STATISTICAL SAMPLING AND INFERENCE

GenCod A004697

Owner professor Sandra DE IACO

Teaching in italian STATISTICAL SAMPLING AND INFERENCE

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SSD code SECS-S/01

Reference course ECONOMICS AND FINANCE

Course type Laurea

Credits 8.0

Teaching hours Front activity hours: 64.0

For enrolled in 2020/2021

Taught in 2021/2022

Course year 2

Language ENGLISH

Curriculum PERCORSO COMUNE

Location Lecce

Semester Second Semester

Exam type Oral

Assessment Final grade

Course timetable https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION	Statistical Sampling and Inference course provides the theoretical basis for dealing with inferential problems. An introduction to the analysis of spatial data is given.
REQUIREMENTS	Elements of descriptive statistics and linear algebra

COURSE AIMS

The course aims to provide
-some elements of sampling theory
-methodologies and tools of statistical inference in order to analyze data coming from a sample survey
-elements of geostatistical analysis

Expected learning outcomes according to Dublin Descriptors:

Knowledge and understanding:
- Acquisition of the tools of Inferential Statistics for the estimation of a large variety of economic and financial aspects, by observing a sample extracted from the reference population.
- Knowledge of inductive methods of Inferential Statistics for identifying, estimating and testing hypothesis on the parameters of statistical models to be used for forecasting and decision-making purposes.
- Knowledge of statistical methods and procedures for exploratory analyses of univariate and multivariate data.

Applying knowledge and understanding
- Ability to explain economic and financial phenomena through statistical data analysis and by constructing suitable models, also by means of advanced calculation tools and sophisticated algorithms.
- Ability to plan a sample statistical survey.
- Presentation and detailed interpretation of inferential results in economic and financial contexts.

Making judgements
-Ability to translate a knowledge requirement into statistical terms in the study of economic and financial dynamics.
- Ability to use the results of data analysis to formulate hypotheses, to obtain strategic orientations, to take decisions in conditions of uncertainty.
- Ability to evaluate the results of a survey from the ethical and deontological point of view, in order to avoid inappropriate use of statistical information.

Communication skills
- Ability to explain methods, results and interpretations of statistical results, also with the aid of audiovisual techniques, both to experts and specialists in statistical fields.
- Ability to define and explain the statistical purposes of a study when talking to non-expert people.
- Ability to communicate the results of statistical analyses with appropriate technical language.

Learning skills
Ability to integrate knowledge and expertise in different contexts, by following the evolution of the discipline.

TEACHING METHODOLOGY

In-person lectures on theoretical and practical aspects with the use of audiovisual supports.
Due to Covid-emergency, lectures might be held remotely on the Microsoft Teams platform.

ASSESSMENT TYPE	Written and oral examination. **In-person examination** The examination consists of a 60 minutes -written test, an oral test accessible after passing the written exam and a discussion of an essay previously sent by email to the teacher. **Online examination (due to COVID-19 medical emergency)** Oral examinations will be held remotely on the Microsoft Teams platform. The oral examination concerns theoretical aspects, exercises and discussion of an essay previously sent by email to the teacher. After passing the examination, a report is drawn up, signed by the President and the members of the committee, as well as by the student. In the case of oral examination, the report is digitally signed by the President of the committee. The examination is passed when a mark of at least 18/30 (with possible award of the honors/laude) is given. Also the corresponding ECTS (European Credit Transfer System) are assigned. The student passing the examination acquires notions which are recognized according to the Dublin descriptors. "The disabled student and/or student with learning disability, who intends to take advantage of an individualized intervention to carry out the examination have to contact the Disabled Integration Office of the University of Salento (contact reference person: paola.martino@unisalento.it). Program, texts and examination methods are the same for both students regularly attending and not regularly attending the lessons. **Examination board** De Iaco Sandra (president); Posa Donato (member); Maggio Sabrina (member); Palma Monica (member), Claudia Cappello (member); Giuseppina Giungato (member), Distefano Veronica
ASSESSMENT SESSIONS	https://www.economia.unisalento.it/536

OTHER USEFUL INFORMATION	- The attendance of lessons, although not mandatory, is highly recommended. -Examination booking on the web site *studenti.unisalento.it* has to be verified by printing the corresponding receipt. In case of technical problems, the student has to contact the teacher at least 7 days before the date of examination. -Requests for postponing an examination, to be sent by e-mail to the teacher, are considered only if they are received within two days before the date of examination. Alternatively, the postponement of the exam can be requested only during the examination. Postponement are possible only within twelve months. The online exam will take place according to the guidelines provided by the last Rector's Decree and published on the web site *www.unisalento.it* After the examination booking, students are invited to register on the Microsoft Teams platform, according to the indications published on the page *https://www.unisalento.it/lezioni-online*
FULL SYLLABUS	1. Principles of statistical inference. 2.Combinations and random experiments. 2.2 Combinations and rules of counting. 2.3 Random experiments; 2.4 Sample space and events. 3. Theory of probability, 3.1 Historical notes, 3.2.1 Classical conception, 3.2.5 Axiomatic theory; 3.2.6 Probability space 3.3 Conditional probability and independence 3.3.1 Conditional probability. 3.3.3 Independence between events 3.4 Practical rules. 4. Random variables, 4.1 Some general concepts; 4.2. Distribution function 4.3 Discrete random variables; 4.4 Absolutely continuous random variables; 4.6. Random moments: expected value; variance; 4.6.3 Standardized random variable. 5. Distribution of notable probabilities, 5.1.2. Distribution of Bernoulli 5.1.3. Binomial distribution; 5.1.5 Poisson distribution; 5.2.2. Gaussian distribution; 5.2.5. Chi-square distribution; 5.2.6. Student's T distribution 5.2.7. Fisher F distribution. 6. Random sampling and statistical inference. 6.1. Paradigms of statistical inference; 6.2. Formalism of classical statistical inference; 6.4. Parametric and non-parametric estimation methods; 6.5 Likelihood function 6.6. Statistics and sample distributions; 6.7.2 Central limit theorem. 7. Punctual estimate. 7.1 Estimators and estimates of a parameter, 7.2 Properties of estimators. 8. Estimation by intervals. 8.1 Confidence intervals for a parameter 8.2. Confidence intervals for the expected value; 8.3. Confidence intervals of variance; 8.3.1. Parametric inference for variance (for small samples); 8.4. Confidence intervals for a proportion (for large samples). 9. Verification of hypotheses. 9.1. Hypothesis testing for a parameter; 9.3 Verification of the hypotheses for the expected value; 9.4 Verification of variance hypotheses: 9.4.1 Parametric texts for variance in the hypothesis of Gaussianity (for small samples); 9.5. Hypothesis testing for a proportion (for large samples). Elements of Spatial Statistical Analysis: 1 Geostatistics; 2 Description of spatial data, 3 A model for spatial data, 4 Spatial correlation. 4.1 Considerations on spatial correlation; 4.2 Conditions of eligibility; 4.4. Properties of the covariogram 4.4.1 Asymptotic behavior; 4.5 Properties of the variogram; 4.5.1 Typical behavior: saddle and range; 4.5.2 Behavior near the origin; 4.5.3 Asymptotic behavior; 4.6 Anisotropies 4.7 Variogram models 4.8 Estimators of spatial correlation measures; 4.8.1 Some practical rules, 5 Methods of point estimation. Up to paragraph 5.6.2 Equations of stationary kriging.

REFERENCE TEXT BOOKS

-Anderson, Sweeney, Williams. 2008, X Ed., Statistics For Business And Economics, Thomson South-Western [Chapters 1-3 (required basic notion), Chapters 4-10, Chapter 14
-Bhattacharya, G. K., Johnson, R. A., 1996, III Ed., Statistics - Principles and methods, J. Wiley & Sons, New York.
-Dudewicz, E. J., Mishra, S. N., 1988, Modern mathematical statistics, J. Wiley & Sons, New York.
-Edward H. Isaaks, R. M. Srivastava, 1989, An introduction to Applied Geostatistics, Oxford University Press