

**Quantitative economics
(L11QUE-ECON1045)
Quantitative methods
(L11QUM–ECON1047)
Mathematical Economics and Statistical
Methods (ECON1046)**

Alessandro Ruggieri
University of Nottingham

TABLE OF CONTENT

1 Introduction

2 Descriptive statistics

1. Representation of data
2. Measures of centrality
 - Mean, Median, Mode, Geometric Mean
3. Measures of dispersion
 - Range, Percentiles, Interquartile range, Variance, Standard deviation, Coefficient of variation (not for L11QUM)
4. Measures of relationship between variables
 - Covariance, Correlation coefficient

3 Probability and Set theory

1. Set operations
 - Sample space, Union, Intersection, Subsets, Complementarity
2. Set identities
3. Probability

- Definition, Joint probability, Conditional probability, Independence, Bayes theorem

4 Discrete random variables

1. Probability distribution
 - Definition, Cumulative probability function, Joint probability function, Marginal probability function
2. Moments
 - Expected value, Variance, Covariance, Independence
3. Examples of discrete random variables
 - Bernoulli distribution, Binomial distribution, Poisson distribution (not for L11QUM)

5 Continuous random variables

1. Distribution functions
 - Definition, Cumulative distribution function, Joint probability density function (not for L11QUM), Marginal density function
2. Moments
 - Expected value, Variance, Covariance (not for L11QUM), Independence
3. Examples of continuous random variables
 - Uniform distribution, Standard normal distribution, Normal distribution

6 Estimators

1. Definition and properties
 - Definition, Unbiasedness, Efficiency, Mean square error, Asymptotical unbiasedness (not for L11QUM), Consistency (not for L11QUM)
2. The central limit theorem (not for L11QUM)
3. The law of large number (not for L11QUM)
4. Confidence intervals
 - Definition, CI with known variance, CI with unknown variance

7 Hypothesis testing

1. Test statistics
 - Definition, Significance level, Test power (not for L11QUM), P-values
2. Applications
 - Two-sided hypothesis test of population mean, One-sided hypothesis test of population mean, Hypothesis test of a difference in population means (not for L11QUM)

8 Linear regression

1. OLS estimators
 - Definition, Unbiasedness, The Gauss-Markov theorem, Consistency, Goodness of fit
2. Hypothesis testing of regression parameters

References

- Newbold, P., Carlson, W. L., and Thorne, B. (2013). *Statistics for business and economics*. Boston, MA: Pearson.
- Gujarati, D. N., and Porter, D. C. (1999). *Essentials of econometrics* (Vol. 2). Singapore: Irwin/McGraw-Hill.
- Barrow, M. (2009). *Statistics for economics, accounting and business studies*. Pearson Education.
- Salvatore, D., and Reagle, D. (2002). *Statistics and Econometrics, Schaum's Outline Series*.