



UNIVERSITY OF PIRAEUS

1) GENERAL

SCHOOL	ECONOMICS, BUSINESS AND INTERNATIONAL STUDIES		
ACADEMIC UNIT	ECONOMICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	OKΣTA01	SEMESTER	1
COURSE TITLE	STATISTICS I		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
Lectures	4	6	
COURSE TYPE	BACKGROUND KNOWLEDGE		
PREREQUISITE COURSES	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/EBI113/		

2) LEARNING OUTCOMES

Learning Outcomes

Upon completing the course, students will be able to:

- Understand statistical databases, differentiate types of data and variables, and recognize the capabilities of statistical software/platforms/packages.
- Present and analyze data through constructing and interpreting statistical tables, plots and charts, including box-plots, to effectively summarize data.
- Calculate and interpret descriptive measures such as central tendency, variability (e.g., variance, standard deviation), skewness, and kurtosis to describe data distributions.
- Understand probability concepts, definitions, and applications, including finite sample spaces and combinatorial methods.
- Comprehend conditional probability and analyze scenarios involving it while identifying independent events.
- Grasp the definition of random variables, their probability functions, and the distinction between discrete and continuous random variables.
- Distinguish key probability distributions and apply the properties of basic discrete (e.g., binomial, Poisson) and continuous (e.g., normal, exponential) distributions.
- Employ techniques to solve practical problems.
- Develop critical data analysis skills, evaluating statistical results and making evidence-based decisions.

General Competences

- Research, analysis, and synthesis of data and information using suitable software.
- Decision-making.
- Independent work.
- Working in an interdisciplinary environment.
- Promoting free, creative, and inductive thinking.
- Ability to work with numerical data, recognize patterns, and perform calculations to derive insights.
- Familiarity with data types, variables, and data organization for effective analysis.
- Skill in assessing the validity of statistical results and making informed decisions.
- Proficiency in presenting data through charts and interpreting visualized information to draw conclusions.

3) SYLLABUS

The course covers the following topics in-depth:

1. Basic Statistical Concepts

- Introduction to statistics: Definition, scope, and importance in decision-making.
- Types of data: Categorical, numerical, ordinal, and nominal.
- Types of variables: Discrete vs. continuous; dependent vs. independent.
- Overview of statistical software: Introduction to common tools (Excel, R, Python, SPSS).

2. Descriptive Statistics

- Tabular presentation: Frequency tables, relative, and cumulative frequencies.
- Graphical representation: Bar charts, pie charts, histograms, scatter plots.
- Measures of central tendency: Mean, median, mode – applications and differences.
- Measures of variability: Range, variance, standard deviation.
- Skewness and kurtosis: Interpretation and implications.
- Box-plots: Construction and interpretation.

3. The Concept of Probability

- Definitions and approaches: Classical, relative frequency, and subjective probability.
- Probability rules: Addition and multiplication rules.
- Applications: Real-life phenomena understanding through probability.

4. Finite Sample Spaces

- Sample spaces definition: Exhaustive and mutually exclusive events.
- Combinatorial methods: Permutations and combinations – practical applications.

5. Conditional Probability and Independent Events

- Conditional probability: Definitions, formulas, and examples.
- Independence: Testing independence between events.
- Bayes' Theorem: Introduction and applications.

6. Random Variables and Probability Functions

- Random variables: Definitions and types (discrete vs. continuous).
- Probability functions: Probability mass functions (PMF) and probability density functions (PDF).
- Cumulative distribution functions (CDF).

7. Discrete Random Variables and Distributions

- Definitions and applications.
- Expected value and variance: Calculation and interpretation.

8. Important Discrete Distributions

- Binomial distribution: Characteristics, assumptions, and applications.
- Poisson distribution: Applications in rare events.
- Hypergeometric distribution: Differences from binomial distribution.

9. Continuous Random Variables

- Continuous variables: Characteristics and differences from discrete variables.
- Probability density functions (PDF): Graphical and mathematical interpretation.

10. Important Continuous Distributions

- Normal distribution: Properties, significance, and real-life examples.
- Exponential distribution: Key features and applications in time-based phenomena.
- Uniform distribution: Understanding and applications.

Note: Examples, exercises, and applications in economic theory are provided in all sections above.

4) TEACHING and LEARNING METHODS

DELIVERY	In-class lecturing	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	<ul style="list-style-type: none"> • Use of IT tools in lectures and lab exercises. • Communication with students via IT platforms. 	
TEACHING METHODS	Activity	Semester workload
	Lectures	52
	Study and Weekly Preparation	65
	Exercises	20
	Preparation	30
	Final Exam	2
	TOTAL	162
STUDENT PERFORMANCE EVALUATION	<p>Written examination in Greek with:</p> <ul style="list-style-type: none"> ▪ Multiple-choice and short-answer questions. ▪ Application exercises. <p>For ERASMUS students: Evaluation through a written project applying theory and methods to real-world problems.</p> <p>Note: Examination answers are posted on the course e-class immediately after completion.</p>	
ATTACHED BIBLIOGRAPHY	<p>- Suggested Books:</p> <ol style="list-style-type: none"> 1. Introduction to Probability Theory and Applications by M. Koutras (in Greek). 2. Descriptive Statistics and Probabilities-Distributions by Donatos S. George. (in Greek) 3. Statistics: Methods for Business Decisions (4th edition) by Ioannis Chalikias. (in Greek) 4. Statistical Methods and Regression Analysis for New Technologies by Philippakis M. (in Greek) 5. Introduction to Probabilities with Statistical Elements by D. Bertsekas & G. Tsitsiklis. (in Greek) 6. Introduction to Probability Models and Applications by N. Balakrishnan, M. Koutras, K. Politis (in English) <p>- Scientific Journals:</p> <ol style="list-style-type: none"> 1. Journal of the American Statistical Association (JASA) 2. Focuses on software and algorithms for statistical analysis. 3. Journal of Applied Econometrics 4. Review of Economics and Statistics 5. Journal of Business & Economic Statistics (JBES) 6. Computational Statistics & Data Analysis 7. International Journal of Data Science and Analytics <p>.....</p>	