

COURSE OUTLINE: STATISTICS I

GENERAL

SCHOOL	ECONOMICS AND BUSINESS		
ACADEMIC UNIT	ECONOMICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΜΠ301	SEMESTER	2nd
COURSE TITLE	STATISTICS I		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
		3	6
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialized general knowledge, skills development</i>	General background - Compulsory		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://www.econ.uth.gr/en/studies/undergraduate-studies/courses-description/2nd-semester/statistics-i		

LEARNING OUTCOMES

Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i> <i>Consult Appendix A</i> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
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By the end of this course, students will be able to:

1. Know and understand basic statistical concepts in order to be able to distinguish the difference between populations and samples, quantitative and qualitative variables, census and sample surveys, representativeness and accuracy, sampling and non-sampling errors,
2. Construct frequency distributions and calculate/interpret/analyze statistical parameters of central tendency, location, and dispersion,
3. Identify the sample space of a random experiment and then identify/calculate marginal and conditional probabilities and apply the theorems of total probability and Bayes,
4. Understand the differences between discrete and continuous random variables, construct probability distributions for discrete random variables, compute cumulative distribution functions, and calculate the expected values and variances,
5. Realize the properties of normal distributions so that by transforming them to the standard normal distribution to calculate/analyze probabilities using the statistical tables, while at the same time being able to formulate business problems and applying the inverse Normal transformation to determine requested values of percentiles and parameters,
6. Understand the differences between population parameters and sample statistics, so that by applying the central limit theorem to construct/analyze confidence intervals for population means, population proportions and population variance, as well as, to assess the validity of results obtained,
7. Understand the business problem in order to correctly formulate the null and alternative hypothesis, carry out the appropriate test of hypotheses either using appropriate sample statistics at given levels of significance or using the p-value and assess the validity of the results obtained,
8. Carry out the required descriptive and inductive statistical analysis using appropriate statistical software

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international

Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

<i>environment</i>	
<i>Working in an interdisciplinary</i>	<i>Others...</i>
<i>environment</i>	
<i>Production of new research ideas</i>	

The course aims at the following general competencies:

- Search for, analysis and synthesis of data and information with the use of the necessary technology,
- Decision making,
- Autonomous work,
- Promotion of free, creative and inductive thinking,

and the following specific objectives:

(a) To convince students that the information resulting from a good statistical analysis is comprehensive, often accurate, and never useless.

(b) To introduce students to fundamental statistical concepts such as exploratory data analysis, probability and random variables, sample statistics, population parameter estimates, sample distributions, confidence intervals and hypothesis tests.

(c) To familiarize students with computational procedures of descriptive and inferential statistical analysis.

SYLLABUS

1. Descriptive Statistics: Samples and population, Percentiles and Quartiles, Measures of central tendency and variability, Grouped data and frequency distributions, Histogram and the polygon line, Skewness and kurtosis, Chebyshev's theorem, Methods of displaying the data, Pie and bar charts, Box plots.
2. Probability: Random experiment, Elementary outcome, Sample space and events, Classical definition of probability, Probability as the limit of relative frequency, Subjective probability, Axioms and rules for probability, Conditional probability, Joint and marginal probabilities, Independent events, The law of total probability and Bayes' theorem.
3. Random variables: Discrete random variables, Probability distribution and cumulative distribution function, Expected value and standard deviation of a random variable, Bernoulli and Binomial random variables, The Poisson distribution, The negative Binomial Distribution, The Geometric and Hypergeometric distribution, Continuous random variables, Probability density function, The Uniform and Exponential distributions.
4. The Normal distribution: Properties of the Normal distribution, The Standard Normal distribution, Finding probabilities of the Standard Normal distribution, Transforming a Normal random variable to the Standard Normal, The inverse transformation, Normal approximation of Binomial and Poisson distributions.
5. Sampling distributions: Sample statistics as estimators of population parameters, Sampling distribution of the sample mean, Central Limit Theorem, Student-t distribution, Sampling distribution of the variance, Chi-squared and F distributions.
6. Confidence intervals: Confidence intervals for the population mean when the population variance is known and unknown, Confidence intervals for the population proportion, Confidence intervals for the population variance.
7. Hypothesis testing: The Null and Alternative hypotheses, Significance level, Type I and II errors, Power of the test, Hypothesis testing for the population mean, the population variance and the population proportion.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	The learning process is supported through the use of (a) the electronic platform e-class and the institutional email, (b) Microsoft EXCEL, and (c) the statistical package MINITAB

TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	The lectures are delivered in the classrooms of the Department of Economics through the use of Microsoft Office 365 tools (Word, EXCEL, Power-Point). Before each lecture, slides and supporting material have already been posted on the course electronic platform “e-class”, so that students can have access to them during the lecture. The existing technological equipment of the above rooms also enables the use of an electronic whiteboard through a WACOM device, which allows writing in presentations and texts with storage capabilities of rich texts and presentations. The enriched texts containing comments on the lectures and solutions to exercises and problems are also posted in the e-class after the end of each lecture. This uploaded material on e-class includes also files containing additional problems and exercises that students are invited to solve in order to practice and understand the taught material. Solutions and comments on these problems are given either during lectures or during office hours announced by the teacher responsible (in special cases even via e-mail using students’ institutional accounts) More specifically, the workload of the module is analyzed as follows:																
	<table border="1"> <thead> <tr> <th>Activity</th><th>Semester workload</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>39 hours</td></tr> <tr> <td>Study at home</td><td>85 hours</td></tr> <tr> <td>Completion of assignment</td><td>30 hours</td></tr> <tr> <td>Preparation for the final exam</td><td>24 hours</td></tr> <tr> <td>Exams</td><td>2 hours</td></tr> <tr> <td></td><td></td></tr> <tr> <td>Course total</td><td>180</td></tr> </tbody> </table>	Activity	Semester workload	Lectures	39 hours	Study at home	85 hours	Completion of assignment	30 hours	Preparation for the final exam	24 hours	Exams	2 hours			Course total	180
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STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work,</i>	SPRING SEMESTER EXAMINATION PERIOD Individual Assignment: 20% Final Written Exam: 80% REPEAT SEPTEMBER EXAM: Written exam: 100% The problems of the assignment and the written examination are broken down into individual questions, where each question indicates the grade received in the completed answer. The																

<i>essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other. Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	correction of the assignment and the written examination is based on a special marking scheme, for which students are informed during the lectures.
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ATTACHED BIBLIOGRAPHY

Principles of Statistics: 1st ed./2021, Authors: Triola Mario F., Publisher: BROKEN HILL PUBLISHERS LTD

Statistical Thinking in the Business World: 2nd ed./2016, Authors: Aczel Amir, Publisher: BROKEN HILL PUBLISHERS LTD

Statistical Methods for Analysing Business Decisions: 4th edition/2017, Authors: Ioannis Chalikias, Publisher: ROSILI COMMERCIAL - PUBLISHING LTD

Statistics: 3rd ed./2011, Authors: Halkos Georgios, Publisher: G. DARDANOS - K. DARDANOS OE

Statistics: 1st ed./2005, Authors: Papadimitriou Yiannis, Publisher: G. DARDANOS - K. DARDANOS OE