STATISTICAL DATA ANALYSIS

Course code	*FUN107*
Course title	*Statistical data analysis*
Type of course	*Compulsory*
Stage of study	*Undergraduate*
Year of study	*1st*
Semester	*Spring*
ECTS	*6: 24 hours of theory, 24 hours of practice, 112 hours of self- study*
Coordinating lecturer	*Vincentas Vobolevičius, vinvob@ism.lt*
Studies form	*Full-time*
Prerequisites	*-*
Language of instruction	*English*

Course description

This is an introductory course of statistical data analysis. The material covered in the course includes methods of data collection, analysis, presentation of results as well as the use of statistical data analysis software, SPSS®. The course encompasses methods of descriptive statistics, statistical estimates, data comparison hypothesis testing, correlation as well as regression analysis. During the laboratory sessions students will learn to use the statistical data analysis software, SPSS®, types of data, user tools, as well as procedures for data analysis and presentation. Statistical methods and SPSS® software will be applied to the analysis of concrete economic and political data.

Course aim

The goal of the course is to provide students with the theoretical knowledge and practical skills necessary for the analysis of economic and political data. At the end of the course the students should be able to identify and apply the key methods of data analysis, carry out the analysis using specialized software, and to interpret the results.

Course learning outcomes (CLO)	Study methods	Assessment methods
CLO1. To understand the basic terminology used in statistics	Lecture and self-study	Midterm exam and Final exam
CLO2. To understand the basic principles of descriptive statistics	Lecture, lab, and self-study	Midterm exam and Assignment 1
CLO3. To understand the basic concepts of probability	Lecture and self-study	Midterm exam and Assignment 2
CLO4. To understand the basic principles of inferential statistics	Lecture, lab, and self-study	Final exam
CLO5. To be able to utilize the correct statistical test based on sample, and hypothesis	Lecture, lab, and self-study	Final exam and Assignments 2, 3
CLO6. To understand the difference between parametric and nonparametric tests	Lecture and self-study	Final exam
CLO7. To be able to apply basic descriptive statistics to an available data base	Lecture and lab	Assignment 1
CLO8. To be able to apply the appropriate basic inferential statistics to the decision making process	Lecture and lab	Final exam and all Assignments
CLO9. To be able to make generalizations about a population based on a sample from that population	Lecture, lab, and self-study	Midterm exam, Final exam and all Assignments
CLO10. To be able to apply statistical techniques to evaluate basic business hypothesis	Lecture and lab	Midterm exam, Final exam and all Assignments

Quality assurance issues

The lecturer will strive to ensure a variety of teaching methods as well as modes of self-assessment. The feedback from students will always be highly valued and appreciated.

Cheating prevention

The teaching and testing methods are chosen taking into account the purpose of the minimization of cheating opportunities. The course is based and promotes the value of integrity. Lack of academic integrity (erg. plagiarism, copying another person's work, the use of unauthorized aids on examinations, cheating, facilitating acts of academic dishonesty by others) will not be tolerated. Consequences for violations range from zero grade given for the assignments over failure of the course up to disciplinary measures for severe cases.

Course content

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Week	Topic	Contact Hours		Readings
		Lecture	Computer class	
1.	**Introduction.** Study object of statistics. Data collection. Statistical observation. Population and sample. Data structure, research methods and statistics, variables and measurement, statistical notation, ways of obtaining a sample.	2	0	Gravetter (1)
2.	**Frequency Distributions.** Frequency distributions, frequency distribution tables, frequency distribution graphs, the shape of frequency distributions, percentiles, percentile ranks and interpolation, stem and leaf displays, boxplots	2	2	Gravetter (2)
3.	**Central Tendency.** Measures of central tendency: mean, median, mode, central tendency and the shape of the distribution. **Variability.** Measures of variability: range and interquartile range, standard deviation, variance (population / sample)	2	2	Gravetter (3 & 4)
4.	**Introduction to z- Scores.** Concept and use of the z-score: z-scores and the location in a distribution, using z-scores to standardize a distribution, other standardized distributions based on z-scores, computing z-scores for a sample	2	2	Gravetter (5)
	Lab test 1	0	2	
5.	**Overview of Probability.** Brief overview of counting technics in probability, the probability and normal distribution, probabilities and proportions for scores from a normal distribution, probability and the binomial distribution. This will include continuous random variables, the normal distribution, the mean, dispersion and standard deviation of a continuous random variable, the binomial distribution, the exponential distribution.	2	0	Gravetter (6 & 7)
6.	**Introduction to Hypothesis Testing.** The logic of hypothesis testing, uncertainty and errors in hypothesis testing, directional hypothesis tests, the general elements of hypothecs testing	2	2	Gravetter (8)
7.	**Midterm exam**	2	0	
8.	**Introduction to the t Statistic.** The t statistic- an alternative to z, hypothesis tests with the t statistic, measuring effect of size for the t statistic, directional test for the t statistic **The t Test for Two Independent Samples.** Intro to the t statistic for independent measures research design, the assumptions underlying the independent measure t formula	2	2	Gravetter (9 & 10)
9.	**The t Test for Two Related Samples.** Intro to the t statistic related measure design, hypothesis tests and effect size for repeated measures design, uses and assumptions for related measures t tests	2	2	Gravetter (11 & 12)
	Lab test 2	0	2	
10.	**Analysis of Variance (ANOVA).** Overview of one-way ANOVA. Between and Within variance. F distribution. Assumptions behind Analysis of Variance. Effect strength measures.	2	2	Gravetter (13)
11.	**Correlation.** Overview of correlation, the Pearson correlation, understanding and interpreting the Pearson correlation, hypothesis tests with correlation, the Spearman correlation	2	2	Gravetter (16)
12.	**Introduction to Regression.** Introduction to linear regression, testing the significance of the regression equation, analysis of regression **The Chi-Square Statistic: Tests for Goodness of Fit and Independence.** Parametric vs nonparametric tests, the chi-square test for goodness of fit / for independence, assumptions and restrictions for chi-square tests, special applications of chi-square test	2	2	Gravetter (17&18)
	Lab test 3	0	2	
	Total:	24	24	
	Final exam	2	0	

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APPROVED BY
THE STUDY COMMISSION
Minutes No. 02-12-2023-01
as of 6th January 2023

Course assignments and assessment of achievements

Type of assignment	Topics	Evaluation, %
Lab test 1: data, descriptive statistics, plots	1 – 4	5
Lab test 2: one sample, independent sample and RMD t tests	5 – 9	5
Lab test 3: ANOVA, correlation, and regression analysis	10 – 12	5
Homework assignments	1 - 12	15
Midterm exam	1 – 6	30
Final exam	7 – 12	40
	TOTAL:	**100**

The overall assessment of the course (total maximum of 100% is possible) will be composed from evaluations of tasks, which are described as follows:

1. **Lab tests** will count for the **15%** of the final evaluation. There will be 3 assignments, **each worth 5%**. During each lab-test assignment students will analyze different data using SPSS and will report their findings to instructor.

2. Homework assignments will count for 15% of the final grade. Students will complete written homework assignment every week of the semester. The lecturer will grade **three randomly selected assignments with each generating 5%** of the final grade.

3. A two-academic-hour long written **midterm exam** will count for the **30%** of the final evaluation. Midterm may include problems, true and false and multiple-choice questions on the topics discussed during the lecturers of the first half of the course. Only non-text calculators and appropriate tables will be allowed.

4. Two-academic-hour written **final exam** will count for the **40%** of the final evaluation and will include problems, true and false, and multiple-choice questions on the topics discussed during the lecturers of the second half of the course. Only non-text calculators and appropriate tables will be allowed.

Students must complete all tasks of the course at the specified time. Postponing of lab tests is impossible and a retake of the midterm exam will not be allowed. In the case of a negative final evaluation, **retake** is possible, but topics will cover the material of the whole course and will comprise **70%** of the final grade. Precision of composite evaluations is left intact (up to 2 decimal places) until the end of the course and only the final evaluation will be subject to rounding.

Literature

Obligatory:
1. Gravetter F. J., Wallnau L. B. (2009). Statistics for the Behavioral Sciences (8th Edition). Toronto: Thompson.
2. SPSS Tutorial v.15. 2007.
Optional:
3. Elliot A. C., Woodward W. A. (2007). Statistical Analysis Quick Reference Guidebook: With SPSS Examples.
4. Weiss N. A. (2008). Elementary Statistics (7th Edition). Boston: Pearson Education.
5. Lind D. A., Marchal W. G., Wathen S. A. (2010). Basic Statistics for Business and Economics. New York: McGraw.