STATISTICAL DATA ANALYSIS

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| **Course code** | *FUN107* |
| **Compulsory in the programmes** | *All study programmes* |
| **Level of studies** | *Undergraduate* |
| **Number of credits** | *6 ECTS (48 in-class hours + 6 consultation hours + 2 exam hours, 104 individual work hours)* |
| **Course coordinator (title and name)** | *Assoc. prof. Vincentas Vobolevičius* |
| **Prerequisites** | *None* |
| **Language of instruction** | *English* |

# THE AIM OF THE COURSE:

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.

# MAPPING OF COURSE LEVEL LEARNING OUTCOMES (OBJECTIVES) WITH DEGREE LEVEL LEARNING OBJECTIVES (See Annex), ASSESMENT AND TEACHING METHODS

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| **Course level learning outcomes (objectives)** | **Learning objectives for BSc in Business**  **Management** | **Learning objectives for BSc in Social**  **Science** | **Assessment methods** | **Teaching methods** |
| CLO1. To understand the basic terminology used in statistics | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Midterm & Final exam | Lecture and self-study |
| CLO2. To understand the basic principles of descriptive statistics | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Midterm & Assignment 1 | Lecture, lab, and self-study |
| CLO3. To understand the basic concepts of probability | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Midterm & Assignment 2 | Lecture and self-study |
| CLO4. To understand the basic principles of inferential statistics | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Final exam | Lecture, lab, and self-study |
| CLO5. To be able to utilize the correct statistical test based on sample, and  hypothesis | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Final & Assignments  2, 3 | Lecture, lab, and self-study |
| CLO6. To understand the difference between parametric and nonparametric tests | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Final exam | Lecture and self-study |
| CLO7. To be able to apply basic descriptive statistics to available data | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Assignment 1 | Lecture and lab |
| CLO8. To be able to apply the appropriate basic inferential statistics to  the decision-making process | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Final exam, all Assignments | Lecture and lab |
| CLO9. To be able to make | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1. | Midterm exam, | Lecture, lab, |

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| generalizations about a population based  on a sample from that population |  | ELO 3.2. ELO 4.1. | Final exam, all  Assignments | and self-study |
| CLO10. To be able to apply statistical techniques to evaluate basic business hypothesis | BLO 1.2. BLO 3.1.  BLO 3.2 BLO 4.1. | ELO 2.1. ELO 3.1.  ELO 3.2. ELO 4.1. | Midterm exam, Final exam, all Assignments | Lecture and lab |

**ACADEMIC HONESTY AND INTEGRITY**

The ISM University of Management and Economics Code of Ethics, including cheating and plagiarism are fully applicable and will be strictly enforced in the course. Academic dishonesty, and cheating can and will lead to a report to the ISM Committee of Ethics. With regard to remote learning, ISM remind students that they are expected to adhere and maintain the same academic honesty and integrity that they would in a classroom setting.

# COURSE OUTLINE

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| **Topic** | **In-class hours** | **Readings** |
| **Introduction.** Study object of statistics. Data collection. Statistical observation. Population and sample. Data structure, variables and measurement.  **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 | 4 | Gravetter & Walnau (2009), chapters 1 & 2 |
| **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) | 4 | Gravetter & Walnau (2009), chapters 3 & 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 **Overview of Probability.** Brief overview of basics in probability, probabilities and proportions for values from a normal distribution, probability and the binomial distribution. | 4 | Gravetter & Walnau (2009), chapters 5 & 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 | 4 | Gravetter & Walnau (2009), chapters 7 & 8 |
| **Midterm exam** | 4 |  |
| **Introduction to the t Statistic.** The t statistic- an alternative to z, hypothesis tests with the t statistic, one-sample t-tests, measuring effect of size for the t statistic, directional test for the t statistic | 4 | Gravetter & Walnau (2009), chapter 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. | 4 | Gravetter & Walnau (2009), chapter 11 |

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| **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 | 4 | Gravetter & Walnau (2009), chapter 10 |
| **Introduction to Analysis of Variance.** Analysis of variance (ANOVA) is a hypotesis-testing procedure that is used to evaluate mean differences between two or more populations | 4 | Gravetter & Walnau (2009), chapter 12 |
| **Correlation.** Overview of correlation, the Pearson correlation, understanding and interpreting the Pearson correlation, hypothesis tests with correlation, the Spearman correlation | 4 | Gravetter & Walnau (2009), chapter 15 |
| **Introduction to Regression.** Introduction to linear regression, testing the significance of the regression equation, analysis of regression | 4 | Gravetter & Walnau (2009), Chapter 16 |
| **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 | 4 | Gravetter & Walnau (2009), Chapter 17 |
|  | **Total: 48 hours** |  |
| CONSULTATIONS | 6 |  |
| FINAL EXAM | 2 |  |

**FINAL GRADE COMPOSITION**

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| **Type of assignment** | **%** |
| *Group Components 0%* | 0% |
| *Individual Components 100%* | 100% |
| Homework grade | 10% |
| Laboratory grade | 15% |
| Midterm examination | 30% |
| Final examination | 45% |
| **Total:** | **100** |

**DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT**

Students will have to complete **homework assignments** with every topic covered in the course. I will randomly select three assignments, check their solutions and provide feedback to students. The combined grade for homework assignments will comprise **10%** of the final grade.

Students will perform **laboratory work**, using SPSS software, with every topic covered in the course. I will ask students to perform three separate tasks of data analysis in a lab setting and grade their output. The combined grade for the three laboratory tasks will comprise **15%** of the final grade.

A written **midterm examination** will certainly include problem-solving, but might also include true & false and multiple-choice questions on the topics discussed during the lecturers of the first half of the course. The midterm will count for the **30%** of the final evaluation.

A written **final examination** will certainly include problem-solving, but might also include true & false and multiple-choice questions on the topics discussed during the lecturers of the second half of the course. The final will count for the **45%** of the final evaluation.

# RETAKE POLICY

In case of a negative final grade, students can sit foe a retake exam. Such an exam will cover all course material. The weight of a retake is 75%. Homework and laboratory grades are not subject to retake but their evaluation (if positive) will count towards the final grade with the retake exam.

# REQUIRED READINGS

Gravetter, F. and Wallnau, L., 2009. Statistics For The Behavioral Sciences. 9th ed. Belmont, CA: Wadsworth.

# ADDITIONAL READINGS

TBA

# ANNEX

**DEGREE LEVEL LEARNING OBJECTIVES**

# Learning objectives for the Bachelor of Business Management

*Programmes:*

*International Business and Communication, Business Management and Marketing, Finance, Industrial Technology Management*

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| **Learning Goals** | **Learning Objectives** |
| Students will be critical thinkers | BLO1.1. Students will be able to understand core concepts and methods in the business disciplines |
| BLO1.2. Students will be able to conduct a contextual analysis to identify a problem associated with their discipline, to generate managerial options and propose viable solutions |
| Students will be socially responsible in their related  discipline | BLO2.1. Students will be knowledgeable about ethics and social responsibility |
| Students will be technology agile | BLO3.1. Students will demonstrate proficiency in common business software packages |
| BLO3.2. Students will be able to make decisions using appropriate IT tools |
| Students will be effective communicators | BLO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations |
| BLO4.2. Students will be able to convey their ideas effectively through an oral presentation |
| BLO4.3. Students will be able to convey their ideas effectively in a written paper |

# Learning objectives for the Bachelor of Social Science

*Programmes:*

*Economics and Data Analytics, Economics and Politics*

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| **Learning Goals** | **Learning Objectives** |
| Students will be critical thinkers | ELO1.1. Students will be able to understand core concepts and methods in the key economics disciplines |
| ELO1.2. Students will be able to identify underlying assumptions and logical consistency of  causal statements |
| Students will have skills to employ economic thought for the common good | ELO2.1.Students will have a keen sense of ethical criteria for practical problem-solving |
| Students will be technology agile | ELO3.1. Students will demonstrate proficiency in common business software packages |
| ELO3.2. Students will be able to make decisions using appropriate IT tools |
| Students will be effective communicators | ELO4.1.Students will be able to communicate reasonably in different settings according to target audience tasks and situations |
| ELO4.2.Students will be able to convey their ideas effectively through an oral presentation |
| ELO4.3. Students will be able to convey their ideas effectively in a written paper |