Course Unit	Statistics II			Field of study	Quantitative Methods										
Bachelor in	Industrial Management and Engineering			School	School of Technology and Management										
Academic Year	2023/2024	Year of study	2			Level	1-2	ECTS credits	6.0						
Type	Semestral	Semester	2			Code	9104-754-2202-00-23								
Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT -	O -					

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): António Jorge da Silva Trindade Duarte

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Know, select and apply the most common non parametric techniques;
2. Know, select and apply to actual problems the most basic analysis of variance models;
3. Know, select and apply to actual problems the simpler multiple regression analysis models;
4. Use the computer to manipulate data and apply statistical analysis methods.

Prerequisites

Before the course unit the learner is expected to be able to:
Manipulate basic statistical concepts.

Course contents

Basic statistical concepts review. Non parametric statistics. Analysis of variance. Statistical regression analysis.

Course contents (extended version)

1. Basic statistical concepts review:
   - Probability distributions.
   - Confidence intervals.
   - Sample size determination.
   - Hypothesis tests. p-value.
   - Type I and type II errors. Statistical power.
2. Non parametric statistics:
   - Goodness of fit tests (chi-squared and Kolmogorov-Smirnov).
   - Sign test, Wilcoxon test and Mann-Whitney-Wilcoxon test.
   - Correlation tests.
   - Randomness tests.
3. Analysis of variance:
   - One factor (random or fixed) ANOVA model.
   - Two factor (random or fixed) ANOVA models.
   - N factor ANOVA models.
4. Statistical regression analysis:
   - Simple linear regression.
   - Multiple linear regression.

Recommended reading

1. Guimarães, R. C. & Cabral, J. S. (2010), Estatística. Verlag Dashofer Portuguesa (texto principal)
2. Pedrosa, A. C. Gama, S. M. (2018), Introdução Computacional à Probabilidade e Estatística. Porto Editora
3. Wonnacott, T. H. , Wonnacott R. J. , Introductory Statistics for Business and Economic. John Wiley & Sons
4. Iman, R. , Conover W. (1990), Modern Business Statistics. John Wiley & Sons

Teaching and learning methods

The contents of this course will be present and discuss during presential sessions (PS) and not presential sessions (NPS). During PS problems will be solve adopting a question clarification methodology. NPS will, particularly, focus on application problems taking into account the specificity of students needs. The computational work will be done using R/RStudio.

Assessment methods

1. Alternative I - (Regular, Student Worker) (Final)
   - Practical Work - 40% (To be done in classroom and outside the classroom.)
   - Final Written Exam - 50%
   - Portfolio - 10%
2. Alternative II - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese

Electronic validation

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26-02-2024	02-03-2024	09-03-2024