

POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA	SUBJECT DESCRIPTION	MODELO PED.013.03
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Course	Data Science and Artificial Intelligence					
Subject	Probabilidades e Estatística					
Academic year	2023/2024	Curricular year	1st	Study period	2nd semester	
Type of subject	Elective	Student workload (H)	Total: 154	Contact: 60	ECTS	5,5
Professor(s)	Tânia Cristina Gonçalves Robalo Chouzal					
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	(select)	José Miguel Rodrigues Salgado				

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

This curricular unit is an introduction to the study of probability theory and statistical inference, with a view to understanding and applying its main concepts and methods. At the end of the semester, students should have achieved the following objectives:

1. Ability to solve problems involving random variables;
2. The ability to apply and describe the main discrete and continuous probability distributions;
3. Ability to make inferences about population parameters based on sampling distributions, and to carry out hypothesis tests to aid decision-making or to support the preparation of reports.
4. The ability to analyze and discuss results critically, taking into account the context of the practical case under study.

2. PROGRAMME

Chapter 1 - Introduction to probability theory

General considerations

Space of results

Classical concept of probability

Frequentist concept of probability

Properties of probabilities

Conditional probabilities

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Independence of events

Chapter 2 - Random variables and their distributions

Types of random variables

Probability function

Probability density function

Distribution function

Two-dimensional random variables (discrete and continuous)

Expected value and variance

Chapter 3 - Special distributions

Discrete Uniform Distribution

Binomial distribution

Geometric distribution

Poisson distribution

Uniform Distribution

Exponential Distribution

Normal Distribution

Chi-Square Distribution

T-Student distribution

F-Snedecor distribution Central limit theorem

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Chapter 4 - Interval Estimation

Central Variable Method

Confidence Intervals for Averages

Confidence Intervals for Proportions

Confidence Intervals for Variances

Chapter 5 - Hypothesis testing

Notions of null hypothesis and alternative hypothesis, 1st and 2nd kind errors, critical regions, significance level

Hypothesis Tests for the Mean

Hypothesis Tests for Proportions

Hypothesis Tests for Variances

Chapter 6 - Non-parametric tests

Chi-Square Adherence Test

Chi-Square Independence Test

3. PROGRAMME AND OBJECTIVES

1. The themes of chapters 1, 2, 3 and 4 are consistent with objectives 1 and 2 because they deal with content from the field of Probability Theory.
2. The topics in chapters 4, 5 and 6 are consistent with objective 3 because they cover content in the field of Statistical Inference.
3. The 6 chapters will be taught using teaching methodologies that will enable objective 4 to be achieved.

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4. MAIN BIBLIOGRAPHY

1. Ross, S. (2014). A first course in probability, 10th Edition. Pearson Education Limited. ISBN-13: 978-0134753119, ISBN-10: 0134753119
2. Murteira, B., Ribeiro, C. S., e Silva, J. A., & Pimenta, C. (2007). Introdução à estatística. McGraw-Hill. ISBN-978-972-592-468-6
3. Pedrosa, A. & Gama, S. (2016). Introdução Computacional à Probabilidade e Estatística. 3ª edição. Porto Editora.

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The teaching methodology to be followed consists of theoretical lectures, complemented with examples and practical application exercises related, whenever possible, to the area of the course and using Microsoft Excel and Social Package for Social Sciences (SPSS) software. The board, computer, Microsoft Excel software, SPSS and multimedia projector will be used in the different teaching sessions, actively promoting student participation and group/pair work in the practical classroom component. The e-learning platform will be used.

There are two assessment methods: continuous and examination.

Continuous assessment: 2 written tests (graded from 0 to 20) to be taken in person.

Students pass if they meet the following conditions:

- (i) they obtain a mark of 5 or more in each test;
- (ii) the arithmetic average of the 2 tests is greater than or equal to 10 points.

This is for students who have failed the continuous assessment or have not taken it.

In this case, the student takes a written test, graded from 0 to 20. Passing the course requires a final mark of 10 or more.

Students who obtain a final mark of more than 16 may take an oral exam to "defend" the mark obtained. If they do not wish to take the oral exam, their final grade will be 16.

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6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The theoretical-practical lecture method is intended to enable students to acquire theoretical knowledge of the syllabus and apply it in practical situations related to the course area.

Face-to-face tutorial support to apply theoretical knowledge to practical cases. Solving practical exercises using, whenever possible, Microsoft Excel or SPSS as auxiliary tools.

Use of the e-learning platform - distance learning component, to better enable students to follow the course. It is hoped that the theoretical-practical component and the resolution of practical cases will enable students to acquire knowledge and skills in the field of statistics in order to process information to support reports, analyses and opinions in the business sciences.

7. ATTENDANCE

There are no restrictions on attendance.

DATE

19 February 2024

SIGNATURES

Professor(s), Area/Group Coordinator or Head of Department signatures

Professor

(signature)

Area/Group Coordinator

(signature)