SUBJECT TEACHING GUIDE

G1503 - Uncertainty Analysis in Engineering

First Degree in Civil Engineering
Degree in Civil Engineering
BILINGUAL UC-CU CIVIL ENGINEERING PROGRAM
Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	First Degree in Civil Engineering Degree in Civil Engineering		Type and Year	Core. Year 1 Compulsory. Year 1
Faculty	School of civil Engineering			
Discipline	Obligatory Subjects BASIC MATHEMATICS FOR ENGINEERING			
Course unit title and code	G1503 - Uncertainty Analysis in Engineering			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web	https://moodle.unican.es			
Language of instruction	English		Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
Name of lecturer	MARIA DOLORES FRIAS DOMINGUEZ
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Other lecturers	

3.1 LEARNING OUTCOMES
- Ability to analyze data using one and two-dimensional methods of Descriptive Statistics.
- Capacity to solve problems that require using probability models and probability distributions for discrete and continuous random variables.
- Model extreme events selecting the most appropriate approach.
- Ability to apply statistical inference methods to obtain point and confidence interval estimators of parameters, and to test hypotheses.
- Develop computer skills to the practice of statistics in engineering.

4. OBJECTIVES
The overall objective of the subject is the acquisition by the student of a way of thinking that will allow him to approach practical problems in a logical and systematic way from the statistical knowledge and tools learned.
Introduce the student to basic statistical methods and procedures that allow him to summarize information from a large amount of data, characterize variability, or quantify chance.
Instill in our students a proper use of statistical software to solve scientific problems in engineering.

6. COURSE ORGANIZATION	
CONTENTS	
1	Part I
2	Lesson 1. One-dimensional and two-dimensional Descriptive Statistics: Tables, statistics and graphics.
3	Lesson 2. Probability: Probability and properties, conditional probability and Bayes theorem.
4	Part II
5	Lesson 3. Random variables: Discrete and continuous random variables. Probability mass and density function and cumulative distribution function.
6	Lesson 4. Common probability distributions: Most discrete and continuous common probability distributions. Approximation to the Normal distribution.
7	Part III
8	Lesson 5. Statistics of extremes: Order statistics, Exact and asymptotic distributions of order statistics. Excedences.
9	Lesson 6. Probabilistic paper: Probabilistic paper concepts. Some probabilistic papers (Normal, Log-Normal and extreme probability paper)
10	Part IV:
11	Lesson 7. Inference: Introduction. Point and interval estimation. Inference of proportion, mean and variance.
12	Lesson 8. Hypothesis testing: Introduction. Hypothesis testing of proportion, mean and variance.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Exam Part I	Written exam	No	Yes	17,00
Exam Part II	Written exam	No	Yes	18,00
Exam Part III	Written exam	No	Yes	15,00
Exam Part IV	Written exam	Yes	Yes	15,00
Practical exams using specific software	Laboratory evaluation	No	No	20,00
Seminars and other activities.	Others	No	No	15,00
TOTAL				100,00

Observations

The subject is taught and assessed in English only.
Students are only allowed to repeat failed exams during the retake period.
Marks obtained along the year will be valid until the retake period.
The final mark for the retake period will be the weighted average of the different evaluation methodologies indicated in this guide.
The sum of the resulting marks from the four exams should be more than 25% of the total mark of the subject to pass the subject.

Observations for part-time students

The subject is taught and assessed in English only.
The subject can be followed from Moodle.
If required at the beginning of the term, part-time students can the four exams together the day fixed for the final exam.
Practical exams will take place as for the rest of the students to ensure the same evaluation of knowledge and competence.
Works and seminars proposed along the course can be done individually and submitted electronically .

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Devore, J.L. 2012. "Probability and statistics for engineering and the sciences". Canada: Brooks-Cole Cengage Learning. ISBN: 978-0-8400-6827-9.
http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=336954

Cohen, Y.; Cohen, J.Y. 2008. "Statistics and data with R: an applied approach through examples". Chichester:: John Wiley & Sons. ISBN: 978-0-470-75805-2.
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