SUBJECT TEACHING GUIDE

G766 - STATISTICS

Degree in Chemical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering			Type and Year	Core. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Mathematics Basic Training Module				
Course unit title and code	G766 - STATISTICS				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	https://moodle.unican.es/				
Language of instruction	Spanish	English Friendly	Yes	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	CARMEN MARIA SORDO GARCIA

3.1 LEARNING OUTCOMES
- Summarize a set of observations using tables, statistics and graphics.
- Compute probabilities in real problems.
- Identify random variables in real situations.
- Identify the most common probability distributions in real problems.
- Know and apply the basics properties of the punctual estimators and confidence intervals.
- Model simple optimization problems related to engineering.
- Identify the proper methodologies to solve optimization problems.
- Perform a statistical quality control in engineering.
- Develop computational skills to address problems in a context of applications in Engineering.
- Ability to solve statistical problems that may arise in engineering

4. OBJECTIVES
Train students thoroughly in statistical methods to be used in particular problems.
Teach students to apply statistical, optimization and statistical quality control methods and data analysis techniques in practical engineering problems.
Instill in our students a proper use of statistical software to solve scientific problems in engineering.

6. COURSE ORGANIZATION	
CONTENTS	
1	Part I:
1.1	DESCRIPTIVE STATISTICS: Population and sample. Tables, statistics and graphics.
1.2	REGRESSION: Bidimensional data. Lineal regression, exponential and potential models. Model quality.
2	Part II
2.1	PROBABILITY AND RANDOM VARIABLE: Probability definition and properties. Independence. Conditional probability and Bayes theorem. Random variables. probability mass function, probability density function and cumulative distribution funcion.
2.2	COMMON PROBABILITY DISTRIBUTIONS: Bernoulli, Binomial, Negative Binomial, Geometric, Poisson, Exponential, Gamma, Uniform, Normal.
3	Part III
3.1	INFERENCE: Introduction. Inference of proportion, mean and variance.
3.2	HYPOTHESIS TESTING: Introduction. Hypothesis testing of proportion, mean and variance.
4	Part IV
4.1	STATISTICAL QUALITY CONTROL: Introduction. Shewhart control chart.
4.2	OPTIMIZATION. Introduction. Lineal models. Transport problem.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Practical exams.	Laboratory evaluation	No	No	23,00
Writing exam Part I	Written exam	No	Yes	11,00
Writing exam Part II	Written exam	No	Yes	18,00
Writing exam Part III	Written exam	No	Yes	20,00
Writing exam Part IV	Written exam	Yes	Yes	11,00
Seminars and other activities	Others	No	No	17,00
TOTAL				100,00

Observations

Students are only allowed to repeat the failed exams during the retaken 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 performed during the academic year.
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 can be followed from Moodle.
If required at the beginning of the academic year, part-time students can do writing 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

Luceño, A.; González, F.J. 2003. “Métodos Estadísticos para Medir, Describir y Controlar la Variabilidad”. Santander: Universidad de Cantabria. ISBN: 978-84-8102-750-1. http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714

Cobo, A. 1995. “Optimización Matemática”. Santander: Departamento de Matemáticas y Ciencias de la Computación. ISBN: 84-605-2187-7. http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=124088

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. http://catalogo.unican.es/cgi-bin/abnetopac/?TITN= 292113