

## SUBJECT TEACHING GUIDE

### G766 - STATISTICS

#### Degree in Chemical Engineering First Degree in Chemical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering First Degree in Chemical Engineering			Type and Year	Core. Year 2 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	<a href="https://moodle.unican.es/">https://moodle.unican.es/</a>				
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				
E-mail	mariadolores.frias@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO PROFESORES (1046)				
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 and know their usefulness for the modeling of real phenomena.
- 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 the context of engineering applications.
- Ability to solve statistical problems that may arise in engineering

### 4. OBJECTIVES

- Train students to develop a way of thinking that allows him/her to approach practical problems logically and systematically from the knowledge and statistical tools learned.
- To familiarize the student with basic statistical methods and procedures , optimization and statistical quality control as well as their applications in the field of engineering.
- Instill in our students a proper use of statistical software to solve scientific problems in engineering.

### 6. SUBJECT PROGRAM

#### CONTENTS

1	Part I:
1.1	DESCRIPTIVE STATISTICS: Population and sample. Types of data. Frequency tables, statistics and graphics.
1.2	REGRESSION: Two-dimensional data: frequency tables, graphs and statistics. Lineal regression and nonlinear model transformations. Measures of the quality of fit.
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 function.
2.2	COMMON PROBABILITY DISTRIBUTIONS: Most common discrete and continuous distributions. Approximations using the normal normal distribution.
3	Part III
3.1	INFERENCE: Introduction to point estimation. Confidence intervals 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	13,00
Writing exam Part II	Written exam	No	Yes	16,00
Writing exam Part III	Written exam	No	Yes	18,00
Writing exam Part IV	Written exam	Yes	Yes	13,00
Seminars and other activities	Others	No	No	17,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>In the extraordinary period of exams, students will only be able to take those tests indicated as recoverable that they have failed.</p> <p>The grades obtained during the course will be kept until the extraordinary exam period.</p> <p>The final grade for the subject in the special exam period, for those students who take any recovery exam, will be the weighted average of the different assessment methods described in the course guide carried out during the course .</p> <p>To pass the subject, it will be necessary to obtain a grade in all the written exams higher than 25% of the total for the subject.</p>				
<b>Observations for part-time students</b>				
<p>The course can be followed from the Moodle website.</p> <p>Part-time enrolled students (and only them) may take the written exams simultaneously during the established exam period if they request it at the beginning of the course.</p> <p>Attendance at practical exams is mandatory to ensure the evaluation of the same knowledge and skills as their classmates.</p> <p>The assignments given throughout the course can be completed individually and submitted electronically.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
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. <a href="http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714">http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714</a>
Cobo, A. 1995. "Optimización Matemática". Santander: Departamento de Matemáticas y Ciencias de la Computación. ISBN: 84-605-2187-7. <a href="http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=124088">http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=124088</a>
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. <a href="http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=292113">http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=292113</a>