

29908 - Statistics

Syllabus Information

Academic year: 2024/25

Subject: 29908 - Statistics

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 2

Semester: 435-First semester o Second semester

107-First semester

Subject type: Basic Education

Module:

1. General information

The 6-credit Statistics subject is compulsory and is part of the basic training, so it is considered important for future engineers.

Its task is to introduce the student to data analysis in order to obtain the information contained in the data. To this end, aspects of selection, cleaning, presentation and treatment of experimental data are discussed. The student also receives the basic knowledge of the Calculus of Probabilities with the goal of modeling real situations of random nature. They will also learn to perform statistical inference that will allow you to estimate parameters of interest as well as to derive conclusions that will be useful for decision making.

2. Learning results

1. Ability to apply data processing and analysis techniques.
2. Know the fundamental concepts, applications and results of probability.
3. Understand the concepts of unidimensional and multidimensional random variables.
4. Master the modeling of engineering environments under stochastic nature by means of random variables as well as and the performance of calculations in uncertainty situations.
5. Know the sampling and estimation techniques.
6. Know how to use statistical hypothesis testing and its application in decision making.
7. Ability to prepare, understand and critique reports based on statistical analysis.

3. Syllabus

DESCRIPTIVE STATISTICS IN ONE AND TWO VARIABLES

Univariate graphical representations. Numerical measures: mean,.

Regression line.

PROBABILITY SPACES,

Probability space.

Conditional probability. Independence

RANDOM VARIABLES.

Definition of random variable.

Discrete and continuous random variable.

CHARACTERISTICS OF RANDOM VARIABLES

Expectation of random variables.

Variance, standard deviation. Shape measurements.

USUAL PROBABILITY DISTRIBUTIONS

Discrete uniform, binomial, geometric, negative binomial and Poisson distribution.

Poisson process.

Exponential, gamma, continuous uniform, normal, Weibull distribution.

STATISTICS.

Sampling. Estimators: point and interval estimation.

Statistical hypothesis testing and independence.

INTRODUCTION TO OPTIMIZATION

Introduction to the design of experiments.

Table ANOVA.

4. Academic activities

The subject is divided into 4 hours of face-to-face classes per week during the 15 weeks of the four-month period. Of these, 2 hours are given to the entire group for the exposition of theoretical concepts and examples-types. Another 2 hours are presented in small groups, usually in the computer lab, to develop problem-solving and problem-posing skills as well as data analysis.

The Statistical Report will be prepared after the exploratory data analysis has been presented and the different phases will be reviewed periodically

5. Assessment system

The global assessment of the subject includes the following activities carried out continuously throughout the term:

1. The module Calculus of Probabilities is assessed by means of a written test during the teaching period of the subject. (Learning results 2, 3 and 4).
2. The Statistical Inference module is assessed by means of a written test in the official call session of the subject. (Learning results 1, 5 and 6).
3. The contents developed in the practical classes of the subject in the computer laboratory are assessed by means of a written test carried out individually during the teaching period of the subject and/or in the official call. (Learning results 1, 2, 3, 4, 5, 6 and 7).
4. The Descriptive Statistics Module is assessed through the completion of a Report to be done prior to the official call. (Learning results 1, 2, 3, 4, 5, 6, and 7).

The activities that are not passed on the dates established in the first instance may be assessed also in the official call of the subject. Tests 1 and 2 represent, respectively, 35% and 30% and tests 3 and 4 represent 35% of the final grade.

6. Sustainable Development Goals

- 11 - Sustainable Cities and Communities
- 12 - Responsible Production and Consumption
- 13 - Climate Action