Statistics

Code: 103810
ECTS Credits: 6

2020/2021

Degree	Type	Year	Semester
2500897 Chemical Engineering	FB	1	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: Yes

Some groups entirely in Spanish: No

Teachers

Maria Jolis Giménez

Joachim Kock

Prerequisites

There are not prerequisites

Objectives and Contextualisation

The aim of the course is to introduce the basic probability tools and statistics for analyzing data.
Coming from the description of natural phenomena or experiments and focusing their correct use and interpretation of the results. The theory and problems classes will be complemented with practical classes with the objective that the student does a work that requires the use of the computer.

Competences

- Apply ones knowledge when performing measurements, calculations, estimations, evaluations, assessments, studies, reports and other similar tasks.
- Apply relevant knowledge of the basic sciences, such as mathematics, chemistry, physics and biology, and the principles of economics, biochemistry, statistics and material science, to comprehend, describe and resolve typical chemical engineering problems.
- Demonstrate basic knowledge of the use and programming of computers, and apply the applicable IT resources to chemical engineering.
- Develop personal work habits.
- Develop thinking habits.

Learning Outcomes

1. Analyse data and measurements in the area of engineering to extract and comprehend information using statistical tools.
2. Describe non-deterministic engineering processes using random variables and their corresponding distributions.
3. Develop a capacity for analysis, synthesis and prospection.
4. Identify, analyse and calculate magnitudes in the area of engineering using calculation tools in different variables.
5. Identify, describe and apply basic mathematical and statistical concepts.
6. Manage available time and resources. Work in an organised manner.
7. Use specific software to resolve mathematical or statistical problems in engineering.

Content

Topic 1. Descriptive statistics.
Descriptive statistics. Descriptive study of a variable: categorical (sector diagram) and quantitative (median, deviation, bar graph and histogram). Descriptive study of two variables: categorical (contingency tables) and quantitative (regression line, correlation coefficient). Inference concept.
Pearson's independence test.

Topic 2. Probability.
Notion of probability. Conditioned Probability and Independence of Events: Bayes Formula.
Random variables. Expectation and variance of a random variable.
Examples: binomial and normal. Approximation of the binomial by the normal. Independence of random variables.
Software tools for statistical analysis.

Topic 3. Statistical Inference.
Sample and population. Most frequent statistics. Confidence intervals: for the mean and for the variance of a sample, normal population and for proportion. Concept of hypothesis test. Test for the mean and for the variance of a normal population. Test for proportion. Comparison of means and comparison of variances for two normal populations. Comparison of proportions.

Topic 4. Regression and Analysis of variance.
Analysis of simple classification variance. Inference in the linear regression model.

Methodology

We have theoretical, problem and practical classes.

The new subject will be introduced primarily in the theory classes, but the explanations of the new subject will have to be broadened with the autonomous study of the student, with the support of the reference bibliography.

The problems class will be dedicated to the oriented resolution of some proposed problems. The following will be assessed overall delivery, both correction and rigor in resolution as well as vocabulary, mathematical writing and clarity in the written statement.

In the practical classes it will be introduced the use of software with statistical applications (spreadsheets and software packages statistics). Descriptive and inferential methodologies will be seen. These tools can be used to solve problems.

The proposed teaching methodology may undergo some modification depending on the attendance restrictions imposed by the health authorities.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab classes	26	1.04	2, 4, 5
Practical classes	12	0.48	7
Problem classes	12	0.48	2, 5
Type: Supervised			
Tutorials	10	0.4	4, 5
Type: Autonomous			
Individual study	72	2.88	2, 4, 5, 7

Assessment

The final grade of the course has two parts:
- Part 1: Computer-based practice (20% of the final mark)
- Part 2: examinations (35% partial examination, 45% final examination)
In order to pass the course a final grade equal to or higher than 5 out of 10 is required.
A minimum grade of 3.5 must be obtained in the partial examination, in the final examination, and in practices, in order to make the average.

Recovery
The student may apply for make-up Part 2 provided he or she has taken both exams.
(partial and final). Part 1 is irrecoverable.

Qualifications:

High Honours. Awarding an honor roll grade is the decision of the faculty responsible for the subject. UAB regulations state that MH can only be awarded to students who have obtained a final grade equal to or greater than 9.00. Up to 5% of MH of the total number of students enrolled may be awarded.

A student will be considered non-assessable (NA) if he has not presented in a set of activities the weight of which is equivalent to a minimum of two thirds of the total grade of the subject.

Student Irregularities, Copying and Plagiarism

Without prejudice to other disciplinary measures that may be deemed appropriate, the following shall be assessed at zero irregularities committed by the student that may lead to a variation of the grade of an act of evaluation.
Therefore, copying, plagiarism, cheating, letting copy, etc. in any of the evaluation activities will involve suspend it with a zero grade. The evaluation activities qualified in this way and by this procedure do not will be recoverable. If it is necessary to pass any of these evaluation activities to pass the subject, this subject will be suspended directly, without opportunity to recover it in the same course.

The proposed assessment may undergo some modification depending on the attendance restrictions imposed by the health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes

Final examination	45%	3	0.12	1, 2, 3, 6, 5
Lab classes	20%	3	0.12	1, 2, 3, 6, 4, 5
Partial examination	35%	12	0.48	1, 2, 3, 7

Bibliography

R. Delgado de la Torre. Probabilidad y estadística con aplicaciones. Publicación independiente, 8-julio 2018. Amazon.es

Daniel, W.W. Bioestadística. Base para el análisis de las ciencias de la salud, Limusa, 1987.

D. Peña. (2001). "Fundamentos de Estadística". Alianza Editorial.

D. Peña. (2002). "Regresión y diseño de experimentos". Alianza Editorial.