UAB
Universitat Autònoma de Barcelona

Statistics

Code: 106042
ECTS Credits: 3

2024/2025

Degree	Type	Year
2500897 Chemical Engineering	FB	1

Contact

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Teachers

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Teaching groups languages

You can view this information at the of this document.

Prerequisites

Although there are no official prerequisites, it is convenient for the student to review:
1) Newton's binomial theorem and combinatorics.
2) The probability and statistics that you have studied in Secondary and High School.
3) Elementary functions (exponential, logarithm), the use of summation symbol in mathematical notation, deviation and integration.

Objectives and Contextualisation

The aim of the course is to introduce the basic tools of probability and statistics to analyze data from the description of natural phenomena or experiments and draw conclusions, focusing on their correct use and interpretation of results. . It is intended that the student:

Be fluent in the language of probability and statistics used in engineering.
Learn to explore different data sets with descriptive methods as a result of conducting experiments.
Know and understand the concept of random variable and be able to propose the most appropriate probabilistic model in different situations.
Learn to use the methods of Statistical Inference (Hypothesis Tests) to be able to draw conclusions about a population from the partial information contained in a sample.
Familiarize with the use of appropriate computer tools for statistical data processing.

Competences

- 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.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Work in a team.

Learning Outcomes

1. Develop critical thinking and reasoning
2. Identify, describe and apply basic mathematical and statistical concepts.
3. Make one's own decisions.
4. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
5. Use specific software to resolve mathematical or statistical problems in engineering.
6. Work cooperatively.

Content

1. Descriptive statistics. Descriptive study of a variable (pie chart, bar chart and histogram, measures of central tendency and dispersion). Descriptive study of two variables (contingency tables, regression line, correlation coefficient).
2. Notions of probability, conditioned probability and independence of events, Bayes theorem. Random variables. Expectation and variance of a random variable. Examples.
3. Sample and population, most frequent statistics. Statistical inference. Parameter estimation and hypothesis testing. Examples: mean and variance of a normal population. Proportions. Comparison tests. Independence test.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	13	0.52	1, 2, 3, 4
Problem sessions	6	0.24	1, 2, 3, 4
computer sessions	6	0.24	1, 2, 3, 4, 5, 6
Type: Supervised			
Turotials	5	0.2	1, 2, 3, 4, 5, 6
Type: Autonomous			
Self-developed study	30	1.2	1, 2, 3, 4, 5, 6

We have lectures, problems and computer sessions. The new matherial will be introduced primarily in the lecture sessions, but it will be necessary to expand the teacher's explanations with the student's autonomous and group study, with the support of the referenced bibliography. There will be a partial control of theory and problems. In these classes and the work done individually or in small gorups, the basic, specific and transversal competences of the subject are achieved.

The problem sessions will be devoted to the targeted resolution of some proposed problems. Both correctness and rigor in resolution as well as vocabulary, mathematical writing and clarity in written exposition will be taken care of.
The computer sessions will introduce the use of software with statistical applications (spreadsheets and statistical packages). Descriptive and inferential methodologies will be seen.

The UAB Virtual Campus is a fundamental tool for monitoring the subject: access to materials, consultation of deadlines and for monitoring the pace of the course.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of computer sessions	30%	4	0.16	1, 2, 3, 4, 5
Exam	45%	7	0.28	1, 2, 3, 4
Test of problem resolution	25%	4	0.16	1, 3, 4, 6

The evaluation of the subject will consist of two modules:

Module I: consists of

a) a problem test (25%).

b) a final test of the subject (45%)

Module II: participation and evaluation of practices (30%).

Finally, in the examination period a joint reevaluation of Module I is made. The student can go to the reevaluation as long as he or she has attended to a set of evaluation activities that represent a minimum of two thirds of the total qualification of the subject. Module II is not reevaluated.

A weighted average of a minimum of 4 out of 10 is required in the final test (b), or in the reevaluation of Module I. A minimum grade of 4 out of 10 is also required in Module 2. In case of achieving these minimum marks, the final grade is the weighted average. Otherwise, the final grade is calculated as the minimum between the weighted average and 4.5 (all valued out of 10).

The dates of continuous evaluation will be published on the virtual campus and may be subject to possible scheduling changes for reasons of adaptation to possible incidents. These changes will always be reported to the virtual campus (CV) as this is understood to be the usual mechanism for exchanging information between teacher and students.

The highest mark (Matricula de Honor) will be awarded to the best among those students who, having passed a 9 of final grade, have brilliantly achieved, at the discretion of the teaching staff, all the objectives of the subject. Those who have not taken tests that add up to 50% of the course will be considered Non-Assessable.

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student that may lead to a variation in the grade in an assessable activity will be graded with a zero (0) in the corresponding Module and will not be recoverable, which entails a failure in the subject with a finalgradenot exceeding 4.5out of 10. These irregularities include, among others, any type of plagiarism, cheating or allowing to cheat. Having accessible communication devices during assessment tests will also be considered a serious irregularity, whether used or not.

Those who use the single assessment system will take a written exam of the subject with a weight of 70% and then a practical test with a computer with a weight of 30%. Both tests separately require a minimum of 4 out of 10 and the final grade is the weighted average of both tests

Bibliography

1. R. Delgado: Probabilidad y Estadística para ciencias e ingenierías, Editorial Delta, 2008.
2. B.C. Gupta, I. Guttman, K.P. Jayalath. Statistics and Probability with applications for engineers and scientists using minitab, R, and JMP, John Wiley and sons, Inc. Edition 2020. (ebook)
3. D. C. Montgomery, G. C. Runger, Probabilidad y estadística aplicadas a la ingeniería. Limusa Wiley. 2002
4. Y.A.W. Shardt, Statistics for Chemical and Process Engineers : A Modern Approach, Springer 2015 (ebook)
5. R. E. Walpole, R.H. Myers, S.L. Myers. Probabilidad y estadística para ingenieros.Prentice Hall. 1999

Software

Excel, R

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	211	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	212	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	211	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	212	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	213	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	214	Catalan	first semester	morning-mixed
(TE) Theory	21	Catalan	first semester	morning-mixed