UAB
Universitat Autònoma de Barcelona

2023/2024

Statistics

Code: 103816
ECTS Credits: 6

Degree	Type	Year	Semester
2501233 Aeronautical Management	FB	1	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Alan Morte Piferrer

Prerequisites

There are no official prerequisites.

Objectives and Contextualisation

Statistical analysis is one of the subjects taken in the first year of the basic formation course that enhance the foundations of modern scientific thinking. It serves as a base in order to understand the acquisition of knowledge through experience and to give scientific foundations in making different decisions.

The aim of this subject is introducing the basic tools of probability and statistics in order to analyze the data generated from the description of natural, social, economical or experimental phenomena, putting an accent on their correct use and the interpretation of the results. The theoretical sessions will be complemented with problem-solving sessions and classes dedicated to experiments, in which the problem-solving ones will have as their main objective the reinforcement of the contents treated in the theoretical sessions, and as for the experimental sessions, the consolidation of descriptive statistics: techniques such as the use of Excel as a calculating system for data treatment and statistical simulation will be taught and discussed.

Competences

- Apply specific software for solving problems in the aeronautical sector.
- Communication.
- Personal attitude.
- Personal work habits.
- Thinking skills.
- Use knowledge of the fundamental principles of mathematics, economics, information technologies and psychology of organisations and work to understand, develop and evaluate the management processes of the different systems in the aeronautical sector.
- Work in teams.

Learning Outcomes

1. Communicate knowledge and findings efficiently, both orally and in writing, both in professional situations and with a non-expert audience.
2. Critically assess the work done.
3. Develop critical thought and reasoning.
4. Develop curiosity and creativity.
5. Develop independent learning strategies.
6. Develop scientific thinking skills.
7. Develop systemic thinking.
8. Develop the ability to analyse, synthesise and plan ahead.
9. Formulate and solve problems of probability calculation.
10. Infer properties of a population from a sample.
11. Manage time and available resources. Work in an organised manner.
12. Use statistical software.
13. Work cooperatively.
14. Work independently.

Content

1. Descriptive statistics

Descriptive studies done with one variable: qualitative (sector diagrams) and quantitative (mean, deviation, bar charts and histograms). Descriptive studies done with two variables: qualitatives (contingency tables) and quantitatives (regression lines, correlation coefficients and coefficients of determination).

2. Probability

Probability notions. Conditioned probabilities. Independence of events. Discrete and continuous random variables. Expectation and variance of random variables. E.g.: Binomial, Poisson, Uniform, Exponential and Normal distributions. Approximation of the Binomial by the Normal. Independence of random variables.

3. Statistical inference

Samples and populations. Statistics-applicable situations that are frequently observed. Confidence intervals. The concept of hypothesis testing. Hypothesis testing for the means and variances of a Normal population. Hypothesis testing for proportions. Comparing the means of two Normal populations. Comparing proportions. Chi-Square testing for independence and for goodness of fit.

Methodology

The core of the learning process is the student's work. The student learns while working, and the mission of the teachers is to help her/him in these tasks by providing proper information and/or sources, guiding his/her

orientation so that the learning process could be performed efficiently. In this context, and following the original objectives of the subject, the course will be structured with the following activities:

Theoretical sessions

The student acquires the scientific/technical knowledge unique to the subject by assisting the theoretical sessions and by complimenting them with individual studies of the topics that are already explained in class.

Problems and experiments:

The problem-solving/experimental sessions are ones that incorporate a reduced number of students than the theoretical sessions- but with a bigger mission. On the one hand, the scientific-technological knowledge that is introduced in the theoretical sessions will be discussed and worked on in order to expand it and to complete its comprehension through various activities (ranging from the typical resolution of problems to the discussion of practical cases). On the other hand, the problem-solving sessions will work as natural forums that enable the discussions on the benchmarks treated in the experimental ones by supplying the students with the knowledge necessary to go on with the experiments, or by indicating where and how they may acquire it.

The more experimental part of this subject serves as a way to orient the student in a statistics assignment in each one of its stages. It will consist in putting into practice the various concepts that had been introduced during the course using Excel and the statistical packet that it incorporates.

Attention: teaching will be offered on campus or in an on-campus and remote hybrid format depending on the number of students per group and the size of the rooms at 50% capacity.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Experimental classes	12	0.48	2, 6, 7, 8, 4, 3, 10, 9, 13, 12
Theoretical classes	26	1.04	2, 6, 7, 8, 4, 3, 10, 9
oblem-solving classes	12	0.48	2, 6, 7, 8, 4, 3, 10, 9
Type: Supervised			
Individual tutoring	8	0.32	4, 3, 10, 9
Type: Autonomous			
Preparation for experimental works	10	0.4	2, 1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 13, 14, 12
Study and resolution of problems	67	2.68	2, 6, 7, 5, 8, 4, 3, 11, 10, 9, 14

Assessment

The single assessment system is not foreseen in this subject.

The scientific-technological knowledge that the student acquired on the subject will be evaluated, together with his/her ability to analyze and synthesize, the capability of critical thinking and of applying the acquired knowledge in the resolution of the practical situations given.

The evaluation will be brought about in a continuous manner due to various fundamental objectives: the monitorization of the teaching-learning process that permits both the teacher and the student to be aware of the student's achievement level in his/her competences and the correction -if possible- of the deviations that are produced in the process. Another objective is to motivate the students' continuous academic effort instead of the commonly-useless overwork at the last hour.

The continuous evaluation will take into account three different types of activities:

- Two assessment tests throughout the school year that will sum up to represent 60% of the subject's final mark (30%+30%).

- Three problem-solving assignments that will sum up to represent 20% (6.67%+6.67%+6.67%).

- A computer-using practical assessment that will represent the 20% left (proportionally ponderated by the student's assistance to each of the 5 obligatory practical sessions that build up the course).

In order to pass the subject, the following conditions will be essential: obtaining a minimum qualification of 3.5 in each of the two assessment tests, and obtaining a global grade greater or equal to 50 out of a 100 total.

The students who hadn't been able to approve the subject through this continuous evaluation process willbe given access to an additional evaluation only if they present a group of activities thatwould represent a minimum of two-thirds of the total qualification of the subject. This extended evaluation will be made up of:

- A written assessment for the recuperation of the whole course with a total importance of 80% (percentage corresponding to the original two assessments in paper and the problem-solving assignments)*.

- The aggregate of the marks in the practices using Excel, with the original 20% importance.

*If a student has obtained a mark that is equal or superior to 5 in one of the two original tests, he/she will automatically gain the right to decide to recuperate only the part that corresponds to the half of the failed course. In this case, the mark that is adapted from the already approved part of the continuous evaluation will count as a 50% of the final grades in the extended evaluation.

As for the students who are repeating the course, the instruments and the process of evaluation they experience will be the same as those of the students that are enrolled for the first time, given that they could conserve the marks they've obtained the first year in the Excel practices. This option must be formally communicated in letters in the beginning of the course, before October starts. The percentage represented by this 'convalidated activity' will be 20%, as ordinary.

The students who participated only in the evaluative activities which, as a whole, does not sum up to pass 50%, will obtain the qualification of 'Not evaluable'.

The eventual matriculations of honor* will be given according to the qualifications obtained in the continuous evaluation, which means that the recuperation assessment will not have any effect on the assignation of the possible matriculations of honor.

* The "matrícules d'honor" are scholarships given in Spain and in Catalonia to the students that maintained the highest marksduring the school year.

Without prejudice on other disciplinary forms that are considered opportune, and in agreement with the currently dominant academic normatives, any irregularity committed by the student that could result in a variation on the qualification of an evaluative act will be qualified with a zero. For these motives, copying, plagiarizing, or letting another student to copy one's own work (any type of work) will result in a zero, and if

passing it was in any way necessary in order to approve, the whole subject will stay suspended. The evaluated activities that were qualified through these procedures will not be recoverable, and the student will directly be classified as failed in the subject, without any opportunity to recover it in the same school year.

The dates for the continuous evaluation and for the presentation of different works will be published through the virtual campus and can be subject to changes in an attempt to adapt to various incidences. These changes will always be notified via the virtual campus, for this will be the most habitual platform for the exchange of information between the teachers and the students.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery of solved problems	20%	4	0.16	1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 14
Individual written exam n° 1	30%	2	0.08	2, 1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 14
Individual written exam n° 2	30%	2	0.08	2, 1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 14
Practical/experimental works	20%	4	0.16	2, 1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 13, 14, 12
Written exam for recuperation	80%	3	0.12	2, 1, 6, 7, 5, 8, 4, 3, 11, 10, 9, 14

Bibliography

Delgado, R.: Probabilidad y Estadística para ciencias e ingenierías. Delta, Publicaciones Universitarias. 2008.

Bardina, X., Farré, M.: Estadística descriptiva. Manuals UAB, 2009

Software

The practical part of the subject is done using the Excel spreadsheet and the statistical package that this program incorporates.