UAB
Universitat Autònoma de Barcelona

Statistics

Code: 103240
ECTS Credits: 6

2024/2025

Degree	Type	Year
2501925 Food Science and Technology	FB	1

Contact

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Teaching groups languages

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Prerequisites

Although there are no formal prerequisits, it is recommended that the student reads up on:

1) Elementary combinatorics and the Newton binomial.

2) The probability theory and statistics studied in high school.

3) Elementary functions (exponential, logarithm), summations.

It is also recommended that the student follows simultaneously the course Mathematics.

Objectives and Contextualisation

Context:

This is a basic course,introducing the tools of probability theory and statistics. Together with the course in mathematics, it also helps students develop scientific rigour and logical thinking.

Objectives:

1) fluency in the language of probability and statistics.

2) familiarity with descriptive methods in connection with data sets resulting from experiments.

3) ability to choose models approriately.

4) familliarity with the concept of random variable, the basic distributions, and which situations they serve.

5) methods of statistical inference.

6) statistics software.

7) critical spirit when faced with problems, modelling, conclusions, and decision making.

Competences

- Analyse, summarise, resolve problems and make professional decisions.
- Apply knowledge of the basic sciences to food science and technology.
- Apply the scientific method to resolving problems.
- Design experiments and interpret the results.
- Search for, manage and interpret information from different sources.
- Use IT resources for communication, the search for information within the field of study, data processing and calculations.

Learning Outcomes

1. Analyse data using statistical methods and techniques, working with qualitative and quantitative data.
2. Analyse, summarise, resolve problems and make professional decisions.
3. Apply the scientific method to resolving problems.
4. Clean up data: lost data, transformation of variables, anomalous data, case selection and other techniques that precede statistical analysis.
5. Describe the basic properties of point estimators and interval estimators.
6. Describe, using the appropriate graphic and analytical methods, qualitative data on one or more variables.
7. Describe, using the appropriate graphic and analytical methods, quantitative data on one or more variables.
8. Design experiments and interpret the results.
9. Explore behaviour patterns of univariate and bivariate data.
10. Identify and select the most important information sources for the descriptive analysis of data of different types: environmental, healthcare, economic, etc.
11. Identify statistical distributions.
12. Interpret the results obtained and draw conclusions regarding the experimental hypothesis.
13. Search for, manage and interpret information from different sources.
14. Summarise and discover behaviour patterns in data exploration.
15. Use IT resources for communication, the search for information within the field of study, data processing and calculations.
16. Use specific statistical software for the descriptive analysis of data.
17. Use spreadsheets for the descriptive analysis of data.
18. Use statistical inference as an instrument for making predictions.
19. Use statistical software to analyse data using inference techniques.
20. Use statistical software to manage databases.
21. Use statistical software to obtain summary indices of the variables in the study.
22. Use the properties of density functions.
23. Use the properties of distribution functions.
24. Use univariate and bivariate summary indices.
25. Validate and manage information to be processed statistically.

Content

1. <u>Descriptive statistics</u>

Data and error. Descriptive analysis of data from one random variable. Disitributions, ffreequencies, graphical representation, numerical summaries (position, dispersion, form). Descriptive analysis of data from two random variables: correlation, regression line, cross tables.

2. <u>Probability</u>

a) Basic properties of probablity. Conditional probability. Total probability and Bayes' formula.
b) Discrete random variables" Bernoulli, Binomial, Poisson.
c) Continuous random variables. The normal distribuion.

3. Statistics

a) Introductino to Statistics: població and sample, parameters and estimators, independen variables. Sample mean distribution in the normal case with known variance. The Z-statistic. Cofidence interval for the mean of a normal distribution with known variance.
b) Student t-distribution. Case of unknown variance: T-statistic. Confidence interval for the mean of a normal distribution with unknown variance. Sample proportion. Assymptotic interval for a propoertion.
c) Introduction to hypothesis testing. Hypothesis test for the mean of a normal distribution with known variance. Hypothesis test for the mean of a normal distribution with unknown variance. Hypothesis test for a proportion. Test for comparing two means.
d) Goodness of fit test with chi square. Test for independence, test for homogeneity.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Computer lab classes	15	0.6	1, 2, 3, 13, 4, 6, 7, 8, 24, 9, 11, 10, 14, 15, 17, 16, 19, 20, 21, 25
Problem classes	15	0.6	1, 2, 3, 13, 6, 7, 8, 24, 9, 11, 18, 12, 14, 22, 23
Theory	22	0.88	1, 2, 3, 5, 6, 7, 8, 24, 11, 18, 12, 14, 22, 23
Type: Supervised			
Tutorials	10	0.4	1, 2, 3, 13, 4, 5, 6, 7, 8, 24, 9, 11, 10, 18, 12, 14, 15, 17, 22, 23, 16, 19, 20, 21, 25
Type: Autonomous			
Self-study and problem solving	73	2.92	1, 2, 3, 13, 4, 6, 7, 8, 24, 9, 11, 10, 18, 12, 14, 15, 17, 22, 23, 16, 19, 20, 21, 25

- Theory classes:

lectures

- Problem classes:

individual or group work, under the supervision of the teacher.

- Computer lab classes:

Individual work with a computer, solving exercises.

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
Computer lab	20%	1.5	0.06	1, 2, 13, 4, 6, 7, 24, 9, 10, 12, 14, 15, 17, 16, 19, 20, 21, 25
First written exam	30%	3	0.12	1, 2, 3, 13, 5, 6, 7, 8, 24, 11, 18, 12, 14, 22, 23, 25
Homework	15%	4	0.16	1, 2, 3, 5, 6, 7, 8, 24, 9, 11, 18, 12, 14, 22, 23
Recovery exam	65%	3.5	0.14	1, 2, 3, 13, 5, 6, 7, 8, 24, 9, 11, 18, 12, 14, 22, 23, 25
Second written exam	35%	3	0.12	1, 2, 3, 13, 5, 6, 7, 8, 24, 9, 11, 18, 12, 14, 22, 23, 25

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Two written exams during the semester, together accounting for 65% of the final grade. Further 15% corresponds to homework assignments, and 20% for the computer lab sessions.

To pass the course, a total score of 5 out of 10 is required, and for each written exam it is furthermore required to obtain a grade 4 (out of 10).

Students not passing these requirements will take a recovery exam. This subject does not contemplate the single evaluation system.

Bibliography

1. Delgado, R. Iniciación a la probabilidad y la estadística, Materials UAB 153.
2. Bardina, X., Farré, M. Estadística descriptiva, Manuals UAB, 2009.
3. Devore, Jay L. Probabilidad y Estadística para ingeniería y ciencias, International Thomson Editores, 1998.

Software

Microsoft Excel

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	morning-mixed
(SEM) Seminars	1	Catalan	first semester	morning-mixed

(SEM) Seminars	2	Catalan	first semester	morning-mixed
(SEM) Seminars	3	Catalan	first semester	morning-mixed
(SEM) Seminars	4	Catalan	first semester	morning-mixed
(TE) Theory	1	Catalan	first semester	morning-mixed