COURSE DATA

DATA SUBJECT

Code: 34454
Name: Statistics
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Facultat de Medicina i Odontologia	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1204 - Degree in Medicine	Statistics	BASIC

COORDINATION

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SUMMARY

The Statistics subject is conceived as an indispensable subject for the formation of any experimental scientist. Its goal is to provide the student with the tools and necessary concepts to formulate statistical hypothesis, to recognize simple probabilistic models, to analyze data statistically, which have been directly obtained in the clinical practice or a result of laboratory experimentation, and to take decisions based on the conclusions obtained form this analysis.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Students will have achieved an appropriate level of mathematics and probability at high school or equivalent.
- Two-dimensional distributions. Relationships between two statistical variables. Linear regression.

- Study of joint, conditional, total and posteriori probability.
- Binomial and Normal distributions as a tool for assigning probabilities to events.

COMPETENCES / LEARNING OUTCOMES

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Acknowledge diversity and multiculturality.

Be able to formulate hypothesis, gather information and evaluate it critically in order to solve problems by following the scientific method.

Capacity for communicating with professional circles from other domains.

Consideration of ethics as a fundamental value in the professional practise.

Criticism and self-criticism skills.

Establish a good interpersonal communication which may allow professionals show empathy and talk to the patients efficiently,as well as to their relatives, the media and other professionals.

Is able to design and elaborate simple statistic studies by using computer programming and interprets the results.

Is able to handle a personal computer with autonomy, uses searching and retrieval information systems, knows and handles clinical documentation procedures.

Know how to use the sources of clinical and biomedical information available, and value them critically in order to obtain, organise, interpret and communicate scientific and sanitary information.

Knows, evaluates and uses technology and sources of clinical and biomedical information to obtain, organise, interpret and communicate clinical, sanitary and scientific information.

Knows key concepts of biostatistics and their application to medical sciences.

Knows the principles of the scientific method, biomedical research and clinical trial.

Proper organisation and planning of the workload and timing in professional activities.

Team-working skills and engaging with other people in the same line of work or different.

Understands and interprets scientific texts critically.

Understands and interprets statistical data in medical literature.

Working capacity to function in an international context.

DESCRIPTION OF CONTENTS

I. THEORY

DATA EXPLORATORY ANALYSIS

1. Experimental research in medicine and data analysis. Need of statistical techniques. Some examples.
2. Population and sample. Measurement ranges. Qualitative and quantitative, discrete and continuous data. Examples.
3. Qualitative data description. Absolute and relative frequencies. Relation with the probabilities in population.
4. Quantitative data description. Statistics of localization and dispersion. Percentiles.
5. Data graphic description. Bars and pie charts. Histograms and box diagrams. Other graphic representations.
6. Use of incomplete data. Survival data and Kaplan-Meier curves.

STATISTICAL ANALYSIS OF A POPULATION

7. Sample variability. Performance of the sample average in big samples. The normal distribution. Some examples.
8. Punctual and by intervals estimation of the population average with big samples. Estimation error and its interpretation. Interpretation of the confidence interval.
9. Contrasts of hypothesis about the average of a population with big samples. Unilateral and bilateral contrasts. Contrasts of significance and p-value.
10. Error of Type I and of Type II. Error delimitation to calculate the sample size. Calculation of the sample size through confidence intervals.
11. Statistical study of a population proportion. Bernoulli and Binomial distributions. Estimation of a proportion.
12. Contrast of hypothesis about a proportion. Calculation of the sample size.
13. Estimation of the population average in small samples. Student's T distribution. Confidence intervals.
14. Student's T test for a sample. Solution to a bilateral contrast. Solution to unilateral contrasts.
15. Applicability conditions of the Student's T test for a sample. Normality contrasts. Non-parametric alternatives: signs test and Wilcoxon test

COMPARISON WITH SEVERAL POPULATIONS (CONTINUOUS DATA)

16. Experiments design: paired samples and independent samples. Analysis of paired data.
17. Comparison of two independent samples. Comparison of the population variances, Levene test. Student's T test for two independent samples.
18. Applicability conditions of the Student's T test for samples. Non-parametric alternatives. Wilcoxon test and Mann-Whitney test.
19. Comparison of more than two independent samples. ANOVA chart and F test.
20. Multiple comparisons test. Applicability conditions of the F test. Non-parametric alternatives, Kruskal-Wallis test.

COMPARISON OF SEVERAL POPULATIONS (CATEGORICAL DATA)

21. Comparison of population proportions. 2x2 contingency charts. Chi-squared test.
22. RxC contingency charts. Contrasts of homogeneity and independence. Chi-squared test.
23. Risk factor and relative risk. Ethiologic fraction. Odds ratio.

REGRESSION

24. Relation between two quantitative variables. Correlation coefficients. Least squares line.
25. Model of lineal simple normal homocedastic regression. Estimation and contrasts of hypothesis about the parameters model. Punctual and by intervals prediction.
26. Residues analysis and model adjustment. Changes of variables. Polynomial regression.
27. Regression lines comparison. Covariance analysis.
28. Multiple regression. Residues analysis and model adjustment.
29. Multiple regression. Selection of variables. Prediction.
30. Logistical regression. Residues analysis and model adjustment. Selection of variables. Odds ratio.

II. PRACTICAL SESSIONS

1. Databases. Insertion of date in a database. Basic functioning of this computer tool.
2. Proposal and realization of a scientific experience: objectives, experience design and data observation.
3. Data description.
4. Kaplan-Meier survival curves.
5. Study about a proportion. Binomial test. Sample size.
6. Inference about a population.
7. Analysis of two samples.
8. Comparison of more than two samples. Variances comparison tests. ANOVA chart. Multiple comparisons test. Non-parametric alternatives.
9. Analysis of categorical data.
10. Correlation coefficients. Least squares line. Graphic representation.
11. Residues analysis in the lineal model. Hypothesis estimation and contrast. Prediction.
12. Multiple Linear Regression, ANCOVA and Logistic Regression.
13. Analysis of data. Techniques: Multiple Linear Regression, ANCOVA and Logistic Regression.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	33,00
Computer classroom practice	27,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	25,00
Preparation of lessons	50,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

In the **theoretical lessons** real problems will be set whose resolution requires the methodology corresponding to each topic. Then, the appropriate statistical technique will be presented and the problem resolution will be applied using statistical software. For the preparation of the subject, the student will have a collection of problems, divided into topics, that he/she has to solve by himself/herself.

The **practical sessions**, in the computer room and synchronized with the theory, will allow the student to put into practice these procedures for the problem solving, some of them being delivered to the professor for their assessment. Each student will have a dossier in which the content of each practice will be described, and will include the problems that will be solved in the dossier.

All the documents will be available in the Aula Virtual in pdf format (portable document format).

The gender perspective, the respect for diversity, and the sustainable development goals (SDGs) will be incorporated into teaching, whenever possible.

EVALUATION

The final grade will be obtained by combining the continuous assessment and the final exam.

Continuous assessment (up to 4 points)

Continuous assessment will include:

- Assignments proposed in the theory sessions (up to 2 points).
- Participation and completion of practical activities (up to 2 points).

The points obtained in the continuous assessment will be kept in both calls in the same academic year in which the proposed tasks are presented. If the subject is not passed, the student will choose to repeat the tasks or request that the grade obtained in their first enrollment be maintained, as long as no more than two years have elapsed since it.

Final exam (up to 6 points)

There will be a single theoretical-practical exam, common to all groups, which will assess the following aspects:

- Recognition of the objectives of the medical studies proposed.
- Formal approach to the statistical problem.
- Interpretation of the results and drawing of conclusions.

- Recognition of tables and graphs generated by the software used.

To pass the subject, the mark obtained in the final written test must be greater or equal to 4,5 out of 10, and the global mark must be equal or superior to 5 points.

Attendance at practical activities is mandatory. The student is considered to meet this requirement if he or she has attended a minimum of 80% of these activities and has adequately justified the impossibility of attending the remaining sessions due to the occurrence of a cause of force majeure. It will be essential to comply with this requirement to pass the subject.

Students are reminded of the importance of carrying out evaluation surveys on all the teaching staff of the degree subjects.

REFERENCES

Basic

Bowers, D. (2014). Medical Statistics from Scratch. An Introduction for Health Professional (3 Edition). Wiley.

Milton, J.S. (2007) ¿Estadística para Biología y Ciencias de la Salud¿. Ed. McGraw-Hill

Rosner, B. (2016). Fundamentals of Biostatistics (8 Edition). Cengage Learning.

Samuels, M. L.; Witmer, J. A. y Schaffner, A. (2012) Fundamentos de Estadística para las Ciencias de la Vida (4 Edicion). Pearson.

Samuels, M. L., Witmer, J. A. & Schaffner, A. (2016). Statistics for the Life Sciences (5 Edition). Pearson.

e-Salut RESOURCES:

ClinicalKey Student Medicina, Odontologia y Enfermería [https://uv-es.libguides.com/RecursosSalut]
Acces Medicina [https://uv-es.libguides.com/Access_Medicina]
Médica Panamericana [https://uv-es.libguides.com/Medica_Panamericana]