COURSE DATA

DATA SUBJECT

Code: 33123
Name: Mathematics II
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Facultat de Ciències Biològiques	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	Matemáticas	BASIC

COORDINATION

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SUMMARY

Mathematics II is a basic subject in scientific education. It aims to provide students with the basic concepts and analytical tools required to recognize simple probabilistic models, formulate hypothesis tests, analyze observational or experimental data and make decisions based on the conclusions drawn from these 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

It is assumed that students will have achieved an appropriate level of mathematics and probability at high school or equivalent.

It is recommended that students be able to formulate mathematical problems that arise from everyday situations and use problem solving to investigate and understand mathematical content.

COMPETENCES / LEARNING OUTCOMES

1101 -

Analizar los datos observados utilizando software estadístico adecuado.

Aplicar conceptos matemáticos a casos prácticos de índole biológica.

Capacidad de pensamiento lógico-matemático.

Comprender los conceptos de contraste de hipótesis, estadístico de contraste y p-valor y saber calcularlos.

Comprender los conceptos de estimaciones puntuales y por intervalos y saber calcularlas.

Entender y plantear los problemas de estadística que se presentan en biología.

Saber obtener muestras aleatorias.

Saber seleccionar tamaños de muestra óptimos para los objetivos de un estudio.

Saber utilizar herramientas informáticas para analizar los problemas estadísticos.

Utilización del lenguaje matemático y estadístico.

DESCRIPTION OF CONTENTS

1. Exploratory Data Analysis

1.1.- Populations and samples.
1.2.- Types of variables and relationships between them.
1.3.- Graphical description of variables and analysis of their relationship.
1.4.- Description of samples.
1.5.- Description of populations through probabilistic models.

2. Inferences about a population

2.1.- Parameters of a population.
2.2.- Estimating the population mean.
2.3.- Hypothesis testing of a single population mean.

3. Two Sample Analysis

3.1.- Paired samples.
3.1.1.- Paired Experimental Design.
3.1.2.- T-Test and Confidence Interval.
3.1.3.- Wilcoxon Test.
3.2.- Independent Samples.
3.2.1.- Independent Samples Design.
3.2.2.- T-Test and Confidence Interval.
3.2.3.- Mann-Whitney Test.

4. K Independent Samples Analysis

4.1.- K Independent Samples Design.
4.2.- Analysis of Variance and Post hoc Comparisons.
4.3.- Kruskal-Wallis Test.

5. Categorical Data Analysis

5.1.- Proportion Analysis.
5.2.- Goodness of fit Analysis.
5.3.- Contingency Tables Analysis.

6. Linear Regression

6.1.- Parametric Regression Analysis: The Linear Model.
6.2.- Statistical Inference about the slope.
6.3.- Correlation Coefficients.
6.4.- Multiple Regression.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	31,00
Computer classroom practice	26,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	30,00
Preparation of lessons	25,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Statistical concepts and methods will be introduced during lecture sessions, using data from real studies. The appropriate statistical technique to solve the real problem will be applied by using statistical software. For the preparation of the subject, the student will have a collection of problems, divided into topics that he/she must 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 to solve problems, 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.

Tutorials in reduced groups will serve to remember, discuss, and focus, the concepts that the student must know and understand at the time. They will be based on additional material, provided to students in advance.

All documents will be available in the Virtual Classroom environment in PDF (portable document format).

EVALUATION

Given that the objectives of the subject Mathematics II focus on the application of statistical techniques to real problems, the knowledge acquired in both theoretical and computer sessions will be evaluated together. This evaluation will be carried out in two stages:

1. Continuous evaluation corresponding to:

- active participation in tutorials and seminars (up to 0.5 points, 5% of final grade) and
- of the results presented in the practical sessions (up to 1.5 points, 15% of the final grade).

2. Final exam, involving theoretical concepts and practical skills, consisting of solving problems like those from the practical sessions and the proposed list for independent work. Solving these problems will require interpreting the results provided by the statistical software used during the course (up to 8 points, 80% of final grade).

NOTES:

In the continuous evaluation, a zero mark will be assigned to any required and undelivered tasks.

- The grade earned in continuous evaluation (paragraph 1) will be the same in the two examination periods of the academic year.
- To pass the subject it will be necessary to get a final grade (Continuous evaluation + Final Exam) equal or greater than 5. Of these five points, at least 3.6 points must correspond to the part of the final exam (equivalent to 4.5 points of the theoretical-practical exam evaluated out of 10).

REFERENCES

BASIC

- Rosner, B. (2016). Fundamentals of Biostatistics. Boston, MA. Cengage Learning. 8ª Edición. (Print edition and eBook)
- Samuels, M. L., Witmer, J. A. & Schaffner, A. (2012). Fundamentos de Estadística para las Ciencias de la Vida. Madrid. Pearson Educación. 4ª Edición. (Print edition)
- Samuels, M. L., Witmer, J.A. & Schaffner, A. (2012). Fundamentos de Estadística para las Ciencias de la Vida. México D.F. Pearson Educación. 4ª Edición. (eBook)
- Samuels, M. L., Witmer, J. A. & Schaffner, A. (2016). Statistics for the Life Sciences. 5ª Edición. Pearson. (Print edition and eBook)

ADDITIONAL

- Armitage, P. & Berry, G. (1997). Estadística para la Investigación Biomédica. Madrid: Harcourt Brace. 3ª Edición.
- Armitage, P., Berry, G. & Matthews, J. N. S. (2002). Statistical Methods in Medical Research. 4 th ed. Blackwell, Oxford.
- Bowers, D. (2014). Medical Statistics from Scratch. An Introduction for Health Professional. John Wiley & Sons Ltd. 3ª Edición.
- Quinn, G. P. y Keough, M. J. (2002) Experimental Design and Data Analysis for Biologists. Cambridge University Pres
- Sokal, R. R. y Rohlf, F. J. (2003). Introducción a la Bioestadística. Ed. Reverté
- Milton, J. S. (2007). Estadística para Biología y Ciencias de la Salud. Madrid: Ed. Interamericana - McGraw-Hill. 3ª Edición. (Print edition and eBook)