1. BASIC DATA

Subject	Biostatistics
Degree	Degree in Biotechnology
School/Faculty	Biomedical and Health Sciences
Course	Second
ECTS	6
Character	Basic
Language/s	English
Modalities	On-site
Semester	Second
Academic year	2025/2026
Teacher	Víctor Soto Larrosa

2. PRESENTATION

The subject "*Biostatistics*" belongs to Module III: PHYSICS, MATHEMATICS AND COMPUTER SCIENCE, within the STATISTICS area, and is the only course in this discipline taught in the Biotechnology degree. It provides 6 ECTS credits out of the total 24 ECTS corresponding to basic subjects in the Health Sciences branch. In the degree, it is a basic subject. It is taught in the second year of the Biotechnology degree.

The general objective is for the student to understand the basic tools and analysis techniques used in biotechnological research. This will allow the student to acquire the necessary knowledge and skills to operate effectively in the field of biotechnology and to produce valid, comparable, verifiable, and reproducible information. Furthermore, the course will enable students to critically and correctly interpret results and draw conclusions that allow them to intellectually and empirically manage the significant implications of biotechnological research in scientific and social development.

3. SKILLS AND LEARNING OUTCOMES

Skills

SKILL03. Interpret mathematical, statistical, biophysical, and thermodynamic data by applying the necessary equations or procedures for the study of systems relevant to biotechnology.

• Perform statistical analyses applied to biological sciences.
• Design experiments based on statistical criteria.

Competencies

COMP07. Handle databases and software applicable in the field of biotechnology and interpret the extracted information.
COMP18. Identify and apply mathematical methodologies and tools in the field of biotechnology.

4. CONTENTS

The course content includes:

1. Basic statistical concepts and their application to Biotechnology.
2. Descriptive statistics. Measures of central tendency and dispersion.
3. Fitting and regression between two variables. Correlation analysis.
4. Multivariate analysis: regression and multiple covariance analysis.
5. Probability. Sampling and estimation. Hypothesis testing.
6. Principles of the scientific method.
7. Scientific research models in biological research.
8.

To facilitate understanding, the content is organized into nine learning units, grouped into two distinct content blocks.

BLOCK 1: DESCRIPTIVE STATISTICS, PROBABILITY, PROBABILITY DISTRIBUTIONS, AND ESTIMATION

• **UNIT 1. Application of statistics to health sciences and biotechnology**
• UNIT 1.1. Principles of the scientific method

• **UNIT 2. Descriptive statistics**
• UNIT 2.1. Types of variables. Measures of location and dispersion
• UNIT 2.2. Measures of dispersion. Graphical representation of variables and data tabulation

• **UNIT 3. Probability. Bayes' theorem (diagnostic test)**

• **UNIT 4. Probability distributions**
• UNIT 4.1. Discrete distributions: Binomial
• UNIT 4.2. Continuous distributions: Normal distribution

• **UNIT 5. Sampling and mean estimation, confidence intervals, and sample sizes**

BLOCK 2: INFERENTIAL STATISTICS

• **UNIT 6. Inferential statistics and hypothesis testing. Basic concepts**

• **UNIT 7. Hypothesis tests for comparing qualitative variables**

• **UNIT 8. Hypothesis tests for comparing quantitative variables**

• **UNIT 9. Correlation and regression. Multivariate analysis: regression and multiple covariance analysis**

• **UNIT 10. Scientific study models in biological research**

5. TEACHING AND LEARNING METHODOLOGIES

The following teaching-learning methodologies will be applied:

• Lecture
• Case method
• Cooperative learning
• Problem-based learning

6. LEARNING ACTIVITIES

The types of learning activities and the student's time commitment to each are listed below:

Learning activity	Hours	On-site %
1. Lectures	32	100
2. Asynchronous lessons	8	0
3. Problem-solving	17	70
4. Case-analysis	10	50
5. Independent work	50	0
6. Knowledge assessment tests	6	100
7. Tutoring	15	100
8. Report and writing preparation	7	0
9. Oral presentations	5	100
TOTAL	150	

7. EVALUATION

The evaluation systems and their respective weightings are listed below:

Sistema de evaluación	Peso
Activity 1: On-site knowledge test	50-60
Activity 2: Case-analysis / problem-solving	5-20
Activity 3: Reports and writings	15-35
Activity 4: Oral presentations	5-10

On the Virtual Campus, once enrolled in the course, you will find details about the evaluation activities, deadlines, and specific procedures for each one.

7.1. Ordinary Exam Period

To pass the subject in the ordinary call, students must score at least 5.0 out of 10.0 in all parts of the evaluation. Unpassed parts must be recovered in the extraordinary call. The final grade will be the weighted average of all passed formative activities.

The continuous assessment system requires a minimum of 50% class attendance. Students in on-site programs must justify at least 50% attendance. Failure to justify this attendance allows the instructor to assign a failing grade in the ordinary call. This is in accordance with Article 1.4 of the Regulations for the Evaluation of Official Degree Programs:

(*https://universidadeuropea.com/documents/1798/6.__Reglamento_evaluacion_titulaciones_oficiales_grado_UEM_v2.pdf*)

7.2. Extraordinary Exam Period

To pass in the extraordinary call, students must obtain a grade equal to or greater than 5.0 in all evaluation components not passed in the ordinary call. They must also submit corrected or missing activities.
The final grade will be the weighted average of the passed activities (≥5.0), maintaining the scores obtained in the ordinary call.

8. SCHEDULE

This section outlines the schedule with deadlines for the course's assessable activities.

Actividades evaluables	Fecha
Knowledge test	Semana 7-8; 17-18
Reports and writings	Semana 4;8;11;15
Case-analysis / Problem-solving	Semana 12-13
Oral presentations	Semana 13-14

This schedule may be modified for logistical reasons. Any change will be communicated to students in due time.

9. BIBLIOGRAPHY

The reference materials are available in digital format at the "CRAI Dulce Chacón" library:
• John P. (2013). *Biostatistics for Dummies*. Wiley-Blackwell.
• Michael R. Chernick (2011). *The Essentials of Biostatistics for Physicians, Nurses, and Clinicians*. John Wiley & Sons.

Main printed reference:
• Peña, Daniel. (2013). *Fundamentos de estadística*. Alianza Editorial.
Additional print resources from the "CRAI Dulce Chacón" library:
• Martín Andrés, Antonio (2004). *Bioestadística para las ciencias de la salud*. Norma.
• Robert J. N (2006). *Epidemiología y Bioestadística: Secretos*. Elsevier.
• Erik Cobo (2011). *Bioestadística para no estadísticos*. Elsevier Masson.
• Milton J.S. (2007). *Estadística para Biología y Ciencias de la Salud*. McGraw-Hill.
• Macchi, Ricardo Luis (2015). *Introducción a la estadística en Ciencias de la Salud*. Editorial Médica Panamericana.
• Sánchez González, Juana Mª. (2012). *Introducción a la estadística descriptiva*. Instituto Juan de Herrera.
• Lara Porras, Ana María (2000). *Estadística para ciencias biológicas y ambientales*. Proyecto Sur.
• Campos Aranda, M. (2009). *Problemas de bioestadística resueltos paso a paso*. DM.
• Martínez González, MA. (2009). *Bioestadística Amigable*. Elsevier.
• Álvarez Cáceres, R. (2007). *Estadística aplicada a las ciencias de la salud*. Díaz de Santos.
• Martín Mateo, M. (2010). *Fundamentos de estadística en ciencias de la salud*. UAB.
• García Roldán, JL. (2007). *Cómo Elaborar Un Proyecto De Investigación*. Universidad de Alicante.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

The Educational Guidance and Diversity Unit (ODI) supports students throughout their university journey to help them achieve academic success.
Our focus includes inclusion for students with specific educational support needs, universal accessibility across campuses, and equal opportunities.

We offer:

1. Personalized academic counseling and follow-up
2. Curricular adjustments in methodology and evaluation for students with special needs
3. Extracurricular resources to enhance personal and professional development
4. Vocational guidance and support for those reconsidering their academic choices

Students needing educational support can contact:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

The European University encourages you to participate in satisfaction surveys to identify strengths and areas for improvement related to teaching, the degree program, and the learning process.

Surveys are available on your Virtual Campus or via email.
Your feedback helps improve the quality of the program.

Thank you for participating!
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