VNIVERSITAT ID VALÈNCIA

COURSE DATA

Data Subject	
Code	33101
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)			
Degree	**Center**	**Acad. year**	**Period**
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	1	Second term

Subject-matter		
Degree	**Subject-matter**	**Character**
1104 - Degree in Environmental Sciences	163 - Mathematics II	Basic Training

Coordination	
Name	**Department**
AYALA GALLEGO, GUILLERMO	130 - Statistics and Operational Research
CORBERAN SALVADOR, ANGEL JOSE	130 - Statistics and Operational Research

SUMMARY

This course is an introduction to the basic techniques of statistics. In particular, it aims at a detailed presentation of descriptive statistics, a brief knowledge of probability and a study of estimation and hypothesis testing in one and two normal populations and the estimation and hypothesis testing on one and two proportions. Finally, the problem of multiple linear regression and the analysis of variance is introduced.

PREVIOUS KNOWLEDGE

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Relationship to other subjects of the same degree

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

Other requirements

Previous requirements or recommendations
A basic knowledge of probability and differential and integral calculus of one variable is recommended.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1104 - Degree in Environmental Sciences

- Capacidad de planificar experimentos sencillos útiles para alcanzar objetivos del estudio.
- Capacidad de describir y analizar el conjunto de datos obtenidos en el experimento utilizando software adecuado.
- Saber interpretar los resultados proporcionados por el software utilizado.
- Saber elaborar y presentar un informe del estudio realizado.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Learning Outcomes
Data management is common in Environmental Science. This course aims to provide students with basic techniques for handling data: description, estimation and hypothesis testing.

DESCRIPTION OF CONTENTS

1. Data and descriptive graphical analysis

Let's analyze this data and we start talking about data: what they are, what we find, how to get them.
Histogram.
Box plot.
Sample distribution function.
Non parametric estimators of density function.

2. Numerical descriptives

This topic introduces the most common numerical descriptive. In particular, as measures of location are given the mean, trimmed mean and median. As we consider measures of dispersion range, the interquartile range, variance and standard deviation or standard.

3. Probability

Experiment, random event, and probability.
Discrete and continuous random variable.
Probability function of a discrete variable and density function of a continuous random variable.
Distribution function.
Binomial distribution.
Normal distribution.

4. Estimation of the mean

Estimator and estimates of the mean and variance.
Confidence interval.
Confidence interval for mean.

5. Comparing groups

Point and inteval estimation for the difference of means.
Hypothesis testing for two means.
Comparison of variances.

6. Testing normality

Graphical procedures: qq-plot
Kolmogorov-Smirnov test and chi-square test.

7. Proportions

Point and interval estimation of a proportion.
Comparison of proportions.

8. Multiple linear regression

Multiple linear regression

9. Analysis of variance

Analysis of variance

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	33,00	100
Computer classroom practice	27,00	100
Study and independent work	50,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	10,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course is based on the use of different learning activities which include:
• Lectures.
• Practice computer classroom.

EVALUATION

Assessment of learning will take place in a continuous manner taking into account:
- Control of attendance to the practice classes, with a required minimum of 70% to pass the course, and its use.

- Two checks on the practical classes.

- An exam with exercises and a practical problem using outputs of R and its packages.

70% of the note depends on the exercises of the exam.

10% of the note depends on the practical problem of the exam.

20% rely on the checks carried out during the practical classes and the attendance and use of them.

To apply for the advancement of the exam of this subject, students should be aware that the mandatory activities outlined in this guide have to be accomplished.

REFERENCES

Basic

- P.M. Berthouex and L.C. Brown. Environmental Engineers. Lewis Publishers, second edition, 2002.

- J. Verzani. Using R for Introductory Statistics. Chapman & Hall / CRC, 2005.

- M.L. Samuels and J.A. Witmer. Statistics for the Life Sciences. Pearson Education, 2003

- W. Chase and F. Bown. General Statistics. Wiley and Sons, 1992

Additional

- P. Dalgaard. Introductory Statistics with R. Springer, 2002.

- Walter W. Piegorsch and A. John Bailer. Analyzing Environmental Data. Wiley, 2005

- Clemens Reimann, Peter Filzmoser, Robert Garret, and Rudolf Dutter. Statistical Data Analysis Explained. Applied Environmental Statistics with R. Wiley, Chichester, UK, 2008

- B.F.J. Manly. Statistics for Environmental Science and Management. Chapman & Hall/CRC Press, 2009.