

27211 - Statistics and IT

Syllabus Information

Academic year: 2023/24

Subject: 27211 - Statistics and IT

Faculty / School: 100 - Facultad de Ciencias

Degree: 452 - Degree in Chemistry

ECTS: 6.0

Year: 2

Semester: First semester

Subject type: Basic Education

Module:

1. General information

The objective of the Statistics and Informatics subject is that the student learns to handle the statistical and informatics tools needed in Chemistry. It is intended that, from the knowledge of its contents, they will strengthen the scientific method as a professional practice. They should learn to define a problem, collect and process data and analyse them statistically by choosing the most appropriate computer and statistical tools, with the purpose of drawing conclusions or making decisions based on the analysis performed. They will also learn how to critically analyse studies of this type conducted by others.

The approaches and objectives of the subject are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030: 4 (quality education), 5 (gender equality), 8 (decent work and economic growth) and 10 (reduction of inequalities).

2. Learning results

- Solve information processing problems using spreadsheets and programming
- Summarize information from a data set using descriptive tools and interpret it.
- Solve simple problems of probability calculation and interpret the results.
- Distinguish clearly between inferential and descriptive procedures. Interpret and use point and interval estimation and hypothesis testing in various chemical problems.
- Use a statistical program for the analysis of chemical data, interpret the results, and prepare reports.

3. Syllabus

Activity 1:

Introduction to Computer Science. Computer Applications. Hardware and software. Operating systems. Networks of computers. Programming languages.

Activity 2:

Spreadsheets. Data management. Search for objectives. Structured and modular programming. Data and control structures. Procedures and functions.

Activity 3:

Introduction to Statistics and fundamental concepts. Usefulness of Statistics in Chemistry. Data types.

Exploratory one- and two-dimensional data analysis. Basic concepts of probability and most common random variables.

Activity 4:

Introduction to statistical inference. Point estimate of a parameter. Estimation by intervals of confidence. Hypothesis testing.

4. Academic activities

- Master classes: 25 hours.
- Computerized practices: 35 hours.
- Study: 84 hours.
- Assessment tests: 6 hours.

5. Assessment system

Evaluation of the Computer part

The overall test will consist of the following two parts:

- Global theory test: multiple-choice test and/or short questions (NI1, 25% of the grade).

- Global practical test: individual test in which practical cases are solved(**NI2**, 75 % of the grade).

The final grade for Computer Science will be **NI = 0.25 NI1 + 0.75 NI2**

- In order to pass the Computer Science part, the grade of each of the two tests must be equal to or higher than 4.5 points (out of 10 points) and the weighted average must be equal to or higher than 5 points (out of 10 points).
- In the event that in any of the tests the minimum of 4.5 points is not reached and the weighted average is equal to or higher than 5 points, the Computer Science part will not be considered passed and a grade of 4.9 will be assigned.
- A grade equal to or higher than 4.5 in any of the tests is saved for the second call.

For the two exams of the academic year, the student can replace the evaluation of the theoretical or practical part in the global exam by midterm exams at the end of these activities.

- Partial theory test: same as the global test of activity 1 (25% of the grade)
- Partial practical test: delivery of tasks set during the period of the activity (5 % of the grade) and an individual test in which practical cases are solved (70 % of the grade)
- In order to pass the part of Computer Science in the test to release topics of the syllabus, the grade of each of the two activities must be equal to or higher than 4.5 points out of 10 and the weighted average must be equal or higher than 5 points.
- If a test has a grade equal to or higher than 4.5 points in the releasing test, that grade will be saved for the two calls.
- When $NI1 \geq 4.5$, the student will be able to add up to 0.5 points from the completion of the assignments proposed in the theory classes, to the grade NI1.

Evaluation of the Statistics part

The student will be evaluated in a global way of the Statistics part by means of a test in which questions of activities 3 and 4 of the program of the subject are solved. In each call the test consists of:

- Theoretical issues.
- Case studies, using the statistical program R Commander.

The grade for this test takes a value of 10 points(**NEG**).

In addition, activities will be carried out throughout the term for a total grade of 10 points(**NEA**).

The final grade for Statistics will be **NE = maximum (NEG, 0.8 NEG + 0.2 NEA)**

Final grade of the subject NF

The final grade of the subject will be the average of the two parts: **NF = (NE + NI) / 2**

- In order to pass the subject, it will be necessary to obtain a minimum grade of 5 points in each of the following parts (Computer Science **NI** and Statistics **NE**) of the subject.
- In the case that in any of the parts (Computer Science or Statistics) the minimum of 5 points is not reached and the average is equal or higher than 5 points, the subject will not be considered passed and a grade of 4.9 will be assigned.
- The passed parts are saved for all the calls of the academic year.
- If a student does not show up for one of the parts of the subject, the grade for that part will be 0.