

**COURSE GUIDE** 2023/24

**Faculty** 215 - Faculty of Chemistry

**Cycle** .

**Degree** GQUIMI20 - Bachelor's Degree in Chemistry

**Year** Third year

**COURSE**

26129 - Experiments in Analytical Chemistry

**Credits, ECTS:** 6

**COURSE DESCRIPTION**

In this subject instrumental analysis concepts will be studied by application to real samples. It will consist of two parts: in the first, students will have to work following laboratory guides. In the second, students will have to work in groups in different projects based on the Inquiry Based Learning (IBL) and Research Based Learning (RBL) methodologies.

**COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT**

The students will develop both the basic and the most general competences of the Basic Module in Chemistry, M02CM04 (Analytical Process), TM02CM08 (Selection of the instrumental techniques for chemical characterization), TM02CM09 (Oral and writing presentation), TM02CM10 (Information search and selection), TM02CM11 (Relate chemistry with other important disciplines for the chemical manufacturing field), as well as the most specific competences in Analytical Chemistry.

The committee for Bachelor's Degree coordination is the responsible for the coordination of this subject with the other subjects of the Degree in Chemistry.

**CONTENIDOS TEÓRICO-PRÁCTICOS**

Analytical applications of the following instrumental techniques will be explored: UV-Vis Spectroscopy, Atomic Absorption and Emission spectroscopy, Fluorescence Spectroscopy, Potentiometry, Gas and Liquid Chromatography, Ionic Chromatography and Capillary Electrophoresis.

**TEACHING METHODS**

The 6 ECTS of this subject will be divided as follows:

3.6 ECTS based on a traditional methodology during the first four-month period: students have to follow the indications of a laboratory guide to accomplish the corresponding laboratory experiment, in pairs, and under the teacher supervision. The objective is that students get used to the different techniques frequently used in instrumental analysis. After each experiment, students will have to deliver an inform to the teacher with the main results. Finally, a test exam will be accomplished.

2.4 ECTS based on a project during the second four-month period: students, organized in groups, will work in a project based on a possible scientific myth. Firstly, they will have to answer a survey about the topics that will be treated and then, results will be discussed during a group debate. After that, groups will do a bibliographic work about their specific project in order to propose a methodology of analysis to the teacher. The experimental part of the projects will carry out during 5 laboratory sessions. After that, main results will be examined during a new group discussion. Finally, each group will have to deliver a final report.

**TYPES OF TEACHING**

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching		4		56					
Horas de Actividad No Presencial del Alumno/a		22		68					

**Legend:** M: Lecture-based S: Seminar GA: Applied classroom-based groups  
GL: Applied laboratory-based groups GO: Applied computer-based groups GCL: Applied clinical-based groups  
TA: Workshop TI: Industrial workshop GCA: Applied fieldwork groups

**Evaluation methods**

- Continuous evaluation
- End-of-course evaluation

**Evaluation tools and percentages of final mark**

- Multiple choice test 25%
- Exercises, cases or problem sets 25%
- Teamwork assignments (problem solving, Project design) 50%

**ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

CONTINUOUS ASSESSMENT SYSTEM:

It is mandatory to take part in ALL the proposed activities. A minimum mark of 5.0 is required in each part.

If a student misses more than 7% of the face-to-face classes without justification, will lose the right to be evaluated under the continuous assessment system.

Students may waive the call within a period of one month (week 26 of the course) before the end date of the teaching period of this subject. This resignation must be submitted in writing to the responsible of the subject and, in this case, the student will have a NOT TAKEN in the final mark.

#### FINAL ASSESSMENT SYSTEM:

It will consist of an unique proof, comprising several individual assessment, which will assess if the student has acquired all the required competences. Both experimental and theoretical assessments can be proposed to the students and they can carry out along several days.

To be assessed by an unique final proof, the student has to specifically apply for this option to the teacher before 18 weeks from the beginning of the course.

#### EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

It will be assessed by an unique final test exclusively, but partial positive results obtained during the ordinary call can be maintained.

#### MANDATORY MATERIALS

Lab coat. Security glasses. Lab spatula. pH paper. Notebook. Calculator

#### BIBLIOGRAFÍA

##### Basic bibliography

D.C. Harris. Quantitative chemical analysis, 9th ed. W.H. Freeman and Company, New York, 2017.

D.A. Skoog, F.J. Holler, S.R. Crouch. Principles of instrumental analysis, 7th ed. Cengage Learning, Boston, 2018.

##### Detailed bibliography

J.C. Miller, J.N. Miller. Statistics and Chemometrics for Analytical Chemistry, 6th ed. Pearson Education, Canada, 2010.

V. Barwick, S. Burke, R. Lawn, P. Roper and R. Walker. Applications of reference materials in analytical chemistry. LGC, United Kingdom, 2001.

##### Journals

Journal of Chemical Education. American Chemical Society, Washington. <http://jchemed.chem.wisc.edu>

Analytica Chimica Acta. Elsevier Scientific, Amsterdam. <http://www.sciencedirect.com>

Talanta. Elsevier Scientific, Amsterdam. <http://www.sciencedirect.com>

Analytical Chemistry. American Chemical Society, Washington. <http://pubs.acs.org/journals/anchem/index.html>

##### Web sites of interest

[www.scifinder.cas.org](http://www.scifinder.cas.org)

[www.sciencedirect.com](http://www.sciencedirect.com)

#### OBSERVATIONS