Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2025/26

Faculty 215 - Faculty of Chemistry

Cycle .

Degree GQUIMI20 - Bachelor's Degree in Chemistry

Year Fourth year

COURSE

26140 - Analytical Problem Solving in Biosciences

Credits, ECTS: 6

COURSE DESCRIPTION

This is an applied subject and its main goal is to develop the student’s ability to investigate in literature on a specific analytical problem and to identify, evaluate and propose analytical solutions to the problem.
During the first part of the course, the student will receive a global vision on the applications of analytical chemistry in Biosciences regarding needs of society, ways of approaching the sample, most common instrumental techniques and future challenges.
The students will dedicate the second part of the course to solving a specific analytical problem through a bibliographic search. This searching process will be discussed and evaluated along the academic year in different seminars.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

M03CM06 - Be able to understand the nature of an analytical problem, investigate it in the literature and identify, assess and present analytical solutions.
M03CM11 - Be able to design, programme and carry out experimental processes and use adequate instrumental techniques for different types of chemical problems.
M03CM12 - Possess knowledge of the network tools and services that enable searches for information in the field of chemistry and similar fields.
M03CM14 - Be able to use the information and knowledge gained from the module for training in existing or emerging fields related to chemistry.
M03CM16 - Employ advanced mathematical techniques to consider and resolve matters related to chemistry (data-processing, modelling, etc.).
M03CM17 - Demonstrate observation, analysis and synthesis skills with a capacity for criticism and self-criticism.
M03CM18 - Demonstrate a capacity for learning and for autonomous work for professional development.
M03CM19 - Be able to manage, organise and plan chemical processes, applying criteria of quality and environmental conservation.
M03CM20 - Relate chemistry with other disciplines and understand its impact on the industrial and technological society and the importance of the industrial chemical sector.

Theoretical and Practical Contents

1. Introduction. The analytical process
2. Application fields of analytical chemistry
3. Food analysis
4. Pharmaceutical analysis
5. Clinical analysis
6. Forensic analysis
7. Environmental analysis
8. Applied chemometrics

TEACHING METHODS

Classroom time will be divided in:
> Master classes: lectures on advanced analytical techniques not explained in previous analytical chemistry courses like immunoassays, biosensors, LC-MS or Raman Spectroscopy.
> Computer classes: introduction to chemometrics. Hands on learning using the The Unscrambler (Camo) software for multivariate data analysis.
> Seminars: introduction will be given to general aspects of applied analysis in Biosciences fields like food analysis, forensic analysis or pharmaceutical analysis. Next, the teacher will propose specific analytical problems that students will solve in groups using scientific literature. Finally, a written report will be written and an oral presentation will be given in final seminar. The data for this final presentation will be decided depending on the number of students and groups.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	27	27			6				
Horas de Actividad No Presencial del Alumno/a	40	43			7				

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

- Written test, open questions 55%
- Exercises, cases or problem sets 25%
- Teamwork assignments (problem solving, Project design) 15%
- Oral presentation of assigned tasks, Reading¿ 5%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

1)To pass the course, a minimum grade of four will be required in the written exam.

2)Failure to make the report of the research work and/or the oral presentation (or to do it after the deadline) will suppose a zero in the corresponding sections.

3)In accordance with the regulations for the evaluation of undergraduate students of the UPV/EHU, students are entitled to be evaluated through the final evaluation system, regardless of whether or not they have participated in the continuous assessment system. To do this, students must send in writing to the teacher responsible for the subject, the waiver of continuous assessment before 18th week of the academic year, in accordance with the academic calendar of the center.

4)The resignation to the call will mean the qualification of "not presented". In the case of continuous evaluation, students can waive the call in a period that, at least, will be up to one month before the end date of the teaching period of the corresponding subject (week 26 in the teaching calendar). This waiver must be submitted in writing to the teacher responsible for the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

1)Students who do not pass the subject in the ordinary call, regardless of the evaluation system taken, will have the right to present themselves to the exams and evaluation activities that make up the final evaluation test of the extraordinary call.
2)The evaluation in the extraordinary call will be done exclusively through the final evaluation system. The final evaluation test of the extraordinary call will consist on as many exams and evaluation activities necessary to evaluate and measure the defined learning results, in a way comparable to how they were evaluated in the ordinary call. However, the positive marks obtained by students during continuous evaluation will be kept for the extraordinary call.
3)In the case of having obtained negative results in the continuous assessment carried out during the course, these results cannot be maintained for the extraordinary call. In these cases, the students will be able to obtain 100% of the grade through the final evaluation.

MANDATORY MATERIALS

Se indicará cada curso en la Guía Docente.

BIBLIOGRAPHY

Basic bibliography

D.C. Harris, Análisis Químico Cuantitativo 3ª ed. (6ª ed. Original). Editorial Reverté (Barcelona, 2007).

A. Manz, N. Pamm, C. Iossifidis, Bioanalytical Chemistry. Imperial College Press (London, 2004).

M.R. Smyth (editor), Chemical Analysis on Complex Matrices. Ellis Horwood (Chichester, 1992).

S. Bell, Forensic Chemistry. Pearson (New Jersey, 2006).

F.W. Fifield, P.J. Haines, Environmental Analytical Chemistry 2nd ed. Blackwell Science (2000).

K.H. Esbensen. Multivariate data analysis-in practice, 5th ed. Camo AB Oslo, 2006.

Detailed bibliography

R.G. Brereton, Applied Chemometrics for Scientists. John Wiley & sons (West Sussex, 2007).

E. W. Ciurzek, J.K. Drenen III, Pharmaceutical and Medical Applications of Near-Infrared Spectroscopy. Marcel Dekker (2002).

A. Townshend (Editor), Encyclopedia of Analytical Science. Academic Press (London, 1995).

R.A. Meyers (Editor), Encyclopedia of Analytical Chemistry. Wiley & Sons (Chichester, UK, 2000).

Journals

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

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

Analytical Chemistry. Ed. American Chemical Society,Washington. http://pubs.acs.org/journals/ancham/index.html

Analytical and Bioanalytical Chemistry. Ed. Springer Berlin / Heidelberg. www.springer.com

The Analyst. Ed. RSC Publishing, Cambridge. http://www.rsc.org/Publishing/Journals/an/index.asp

Web sites of interest

OBSERVATIONS