Universidad del País Vasco / Euskal Herriko Unibertsitatea

COURSE GUIDE 2026/27

Faculty 215 - Faculty of Chemistry **Cycle** .

Degree GQUIMI20 - Bachelor's Degree in Chemistry **Year** Third year

COURSE

26138 - Spectroscopic Identification of Organic Compounds **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject "Spectrophotometric Identification of Organic Compounds" corresponds to the third year of the Chemistry Degree. It is one of the electives offered in the Advanced Module.The subject prepares the student to go into the determination of the chemical structure of organic compounds by means of the application of the different spectrometric and spectroscopic techniques. In principal, the students should deepen in the routine interpretation and other more special applications of some of the spectroscopic instrumentation, as UV spectroscopy, Fourier transform Infrared Spectroscopy (FTIR), NMR, Raman and Mass Spectrometry. The information provided by these techniques will allow the student to interpret and elucidate the structure of unknow compounds and/or chemical reactions products.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

This subject is one of the optional ones offered in the Advanced Module and therefore, shares the cross skills assigned to it, and more specifically, the competences of [M03CM06], [M03CM11] y [M03CM17].

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.
M03CM17: Demonstrate observation, analysis and synthesis skills with critical and self-critical ability.
The Grade Coordination Committee is the responsible for the coordination of this subject with the rest of the especiality subjects.

Theoretical and Practical Contents

UV/Visible spectroscopy: Fundamentals, chomophore compounds. Use of tables in the determination of absorption peaks. Exercises.
Fourier transform Infrared Spectroscopy. Spectra resolution. Instrumentation and sample preparation.
Mass spectrosmetry. Basics and intrumentation. Fragmentation proccesses. Main organic compounds mass spectra.
NMR spectroscopy. Fundamentals of the technique and instrumentation. Chemical shift in proton and carbon NMR. Spectra analysis.

TEACHING METHODS

Lectures (M, clases magistrales) focus on providing basic knowledge of the subject.
Practical Classroom Work hours (GA, prácticas de aula) are directed to the application of the acquired theoretical knowledge to solve problems posed by the professor.
Individual assignments will be part of the self-study hours of the students, and consist of the resolution of three problem sets, one of them delivered in the first quarter and two sets delivered in the second quarter.
Practical Lab Work (GL, prácticas de laboratorio) is held individually in the beginning of the second quarter, and consists of registering two infrared spectra (carried out during the lab hours) and their interpretation (carried out as self-study task).

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	40		15	5					
Horas de Actividad No Presencial del Alumno/a	60		22,5	7,5					

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 70%

- Exercises, cases or problem sets 6%
- Individual assignments 24%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The assessment tests and activities for this course will be conducted in accordance with the principles of academic integrity, honesty, and ethical behavior established in the EHU/UPV regulations. Upon enrolling at the University, students signed the Declaration of Commitment to Ethical Conduct and Academic Honesty, undertaking not to engage in plagiarism, academic fraud, or the use of unauthorized materials or devices¿including artificial intelligence tools when they are not expressly permitted¿in exams and academic work. Failure to comply with these obligations may result in the academic and disciplinary consequences provided for in the current university regulations.
In accordance with the regulations governing the assessment of students in undergraduate degree programmes at the EHU/UPV, the following assessment systems are established for this course.
Continuous Assessment:
Continuous assessment consists of various academic activities carried out throughout the academic year. The final mark will be calculated based on the following percentages:

First partial exam (January, eliminatory): 35%
Second partial exam (May): 35%
Coursework and submitted exercises: 24%
Laboratory sessions: 6%

The written exam will account for 70% of the final mark and will be divided into two partial exams (January and May), each contributing 35%.
Students must obtain a minimum mark of 4.0 in each exam, and the overall average must be 5.0 or higher in order to combine it with the other assessment components.
The first partial exam will have an eliminatory character within the continuous assessment system, although it will not constitute an independent official examination session. Students who obtain a mark of 4.0 or higher in this exam will retain this mark until the ordinary May session and may choose to:

Sit only for the second part of the course;
Or retake the entire course, in which case the new mark will replace the previously obtained one.

Students who do not pass the first partial exam must take a final exam in May covering all course content.
Failure to sit the second partial exam by students who passed the first part in January will not automatically result in a ¿No Show¿ grade, as this exam is weighted at less than 40% of the total course grade. In this case, the final mark will be calculated by assigning 0 points to the missed exam.
Failure to sit the May comprehensive exam by students who did not pass the first partial will imply automatic withdrawal from the examination session and they will be graded as ¿No Show¿.
Laboratory work and individual assignments will account for 6% and 24% of the final mark, respectively.
The criteria for withdrawing from the continuous assessment system are set out in Articles 8 and 12 of Chapter II of the regulations governing student assessment in undergraduate programmes at the EHU/UPV. As this is a year-long course, such withdrawal must be submitted in writing to the course instructor within 18 weeks from the beginning of the academic year, in accordance with current EHU/UPV regulations.
Final Assessment:
Students who opt for the final assessment system will take a comprehensive exam on the official date set by the faculty, which will assess 100% of the competences and learning outcomes of the course.
Failure to attend the final exam will imply automatic withdrawal from the examination session and result in a ¿No Show¿ grade, in accordance with the regulations governing student assessment in official undergraduate programmes at the EHU/UPV.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The extraordinary call will be evaluated exclusively through a comprehensive test that will allow students to obtain 100% of the final grade.

MANDATORY MATERIALS

Lab coat and glasses are needed for the laboratory

BIBLIOGRAPHY

Basic bibliography

G. Sócrates. Infrared Characteristic Group Frequencies. 2nd edition. Wiley & Sons Ltd., 1994.
E. Prestch, P. Bühlmann, C. Affolter, M. Baderstcher. Structural Determination of Organic Compounds. Springer-Verlag, 2007.
E. Prestch, T. Clerk, J. Seibl, W. Simon. Tablas para la elucidación estructural de compuestos orgánicos por métodos espectroscópicos, 2ª Edición. Alhambra, 1989.
R. M. Silverstein, G. Bassler, T. Morrill. Spectrometric Identification of Organic Compounds. 5th Edition, Wiley & Sons, Inc., 2005.
S. Wartewig. IR and Raman Spectroscopy: Fundamental Processing. Wiley, 2003.

Detailed bibliography

J.M. Chalmers, P.R. Griffiths. Handbook of Vibrational Spectroscopy. Wiley, 2002.
J. Simpson. Organic Structure Determination using 2D-NMR Spectroscopy. Academic Press, 2008.
N.J. Harrick. Internal Reflection Spectroscopy. Review and Supplement. Harrick Sci. Corp., 1985

Journals

Vibrational Spectroscopy

Web sites of interest

http://www.spectroscopynow.com
http://www.dq.fct.unl.pt/qoa/jas/ir.html
https://sdbs.db.aist.go.jp/sdbs/cgi-bin/cre_index.cgi?lang=eng
http://www.sigmaaldrich.com/spain.html

OBSERVATIONS