UAB
Universitat Autònoma de Barcelona

Organic Synthesis Laboratory

Code: 105042
ECTS Credits: 3

2025/2026

Degree	Type	Year
Chemistry	OB	3

Contact

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Teachers

Albert Granados Toda

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

As defined in the objectives, this subject is the experimental complement of the theoretical subject *Synthetic Methods*. Knowledge acquired in the subject *Structural Determination* will also be put into practice. For this reason, it is extremely recommended that students have passed (preferably) or taken these subjects previously. On the other hand, as the subjects of the 3rd year are based on the knowledge acquired in the subject of the 2nd year *Structure and Reactivity of Organic Compounds*, it is essential to have passed this subject to take the *Organic Synthesis Laboratory*. It should be noted that the reactions that the student will carry out and the compounds that will synthesize and analyze are part of the contents of the aforementioned theoretical subjects and, consequently, both in the laboratory sessions and in the evaluation of this course, these contents are taken for granted.

Objectives and Contextualisation

The main objectives of this experimental subject are:

1. To reinforce the understanding of the concepts acquired in the theoretical subject *Synthetic Methods* that the student has taken in the first semester, by means of a series of experiments of synthesis and characterization of compounds.
2. *2.* To complement the laboratory knowledge acquired as part of the subject of second year *Structure and Reactivity of Organic Compounds*.
3. To provide the student with a solid training in a good number of advanced synthetic techniques, of greater difficulty than those that are part of the laboratories linked to the subjects of the second year.
4. To incorporate the use of some analysis techniques (IR, UVIS, and NMR spectroscopy) that the student will use in the characterization of the compounds.

5. To make students aware of the safety standards of a chemical laboratory and of precautions in the handling of hazardous substances.
6. To learn waste treatment protocols.

Competences

- Adapt to new situations.
- Apply knowledge of chemistry to problem solving of a quantitative or qualitative nature in familiar and professional fields.
- Be ethically committed.
- Communicate orally and in writing in one's own language.
- Develop synthesis and analyses studies in chemistry from previously established procedures.
- Evaluate the health risks and environmental and socioeconomic impact associated to chemical substances and the chemistry industry.
- Handle chemical products safely.
- Handle standard instruments and material in analytic and synthetic chemical laboratories.
- "Interpret data obtained by means of experimental measures, including the use of IT tools; identify their meaning and relate the data with appropriate chemistry, physics or biology theories."
- Manage, analyse and synthesise information.
- Manage the organisation and planning of tasks.
- Obtain information, including by digital means.
- Operate with a certain degree of autonomy and integrate quickly in the work setting.
- Propose creative ideas and solutions.
- Reason in a critical manner
- Recognise and analyse chemical problems and propose suitable answers or studies to resolve them.
- Resolve problems and make decisions.
- Show an understanding of the basic concepts, principles, theories and facts of the different areas of chemistry.
- Show initiative and an enterprising spirit.
- Show motivation for quality.
- Show sensitivity for environmental issues.
- Use the English language properly in the field of chemistry.
- Work in a team and show concern for interpersonal relations at work.

Learning Outcomes

1. Adapt to new situations.
2. Analyse situations and problems in the field of organic and inorganic chemistry, and propose answers or experimental studies using bibliographic sources.
3. Apply the acquired theoretical contents to the explanation of experimental phenomena.
4. Be ethically committed.
5. Characterise synthesised compounds using physical and spectroscopic methods.
6. Classify compounds by their most important reactivity characteristics: acid/base and oxidant/reductant.
7. Communicate in English in the laboratory.
8. Communicate orally and in writing in one's own language.
9. Critically evaluate experimental results and deduce their meaning.
10. Describe basic safety regulations.
11. Determine the performance of a reaction.
12. Develop synthetic and analytic studies in the field of the organic chemistry from previously established procedures.
13. Develop the habits and skills of a laboratory.
14. Draft a laboratory logbook containing descriptions of the developed procedures, the observations made, the results obtained, the interpretation of the same and the conclusions.
15. Evaluate risks in the use of chemicals and laboratory procedures.
16. Follow safety procedures in the chemistry laboratory.

17. Follow standard laboratory procedures.
18. Follow standard laboratory procedures described in English.
19. Handle instruments to record different types of spectrums.
20. Handle standard instruments and material in chemical laboratories for analysis and synthesis in the field of organic chemistry.
21. Identify the main functional groups in organic compounds and some of their reactions.
22. Identify the main reagents in a laboratory and their commercial presentation.
23. Identify the risks of synthetic reagents.
24. Innovate methods for adaptation to the interpretation of a specific molecular structure.
25. Interpret the safety notes on chemistry products.
26. Manage, analyse and synthesise information.
27. Manage the organisation and planning of tasks.
28. Manipulate the main reagents and dissolvents in a chemistry laboratory.
29. Observe the physical and chemical properties of different substances.
30. Observe the reactivity and behaviour of representative compounds in the laboratory.
31. Obtain information, including by digital means.
32. Operate with a certain degree of autonomy and integrate quickly in the work setting.
33. Perform a synthetic and analytic study to determine chemical and physical properties using instructions supplied for a detailed procedure.
34. Perform correct evaluations of the health risks and environmental impact of magnetic fields.
35. Perform standard tests on which the results obtained are based.
36. Predict the reactivity of different organic functional groups under certain reaction conditions, as well as the structure of the products obtained.
37. Propose creative ideas and solutions.
38. Reason in a critical manner
39. Recognise potential risks in the laboratory before they are produced.
40. Recognise potentially dangerous reagents and dissolvents.
41. Recognise the use of each reagent in the laboratory and take appropriate safety precautions in each case (special goggles and/or gloves, extractor hood, gas mask, etc.).
42. Relate knowledge about the structure and reactivity of the elements and chemical compounds with their method or methods of obtainment and/or purification.
43. Resolve problems and make decisions.
44. Safely dispose of waste from chemical reactions.
45. Safely handle inflammable, toxic and/or corrosive reagents.
46. Selectively distinguish the rejection of reagents and chemical products.
47. Show initiative and an enterprising spirit.
48. Show motivation for quality.
49. Show sensitivity for environmental issues.
50. Synthesise and purify a compound chemical.
51. Understand the labelling of chemical reagents in English.
52. Use graphic design programs to draw chemical formulas and their reactions.
53. Use safety equipment properly.
54. Use spectroscopy devices to confirm experimental results.
55. Use suitable strategies for the safe elimination of reagents.
56. Use the basic materials of a chemical laboratory.
57. Use the most common English chemistry terms.
58. Work in a team and show concern for interpersonal relations at work.
59. Work safely in the laboratory while following the adequate procedure.
60. Write simple laboratory reports in English

Content

This course is based on the realization of experiments of variable length in time.

The realization of these experiments will be carried out in 12 sessions of 4 hours each.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory Sessions	48	1.92	1, 2, 3, 9, 5, 6, 7, 8, 47, 48, 10, 13, 12, 11, 44, 46, 51, 34, 60, 26, 27, 21, 22, 23, 24, 25, 57, 20, 19, 45, 28, 4, 49, 30, 29, 31, 32, 36, 37, 38, 35, 33, 40, 41, 39, 14, 42, 43, 16, 17, 18, 50, 59, 58, 54, 56, 55, 53, 52, 15
Subject Presentation	1	0.04	3, 6, 7, 8, 48, 10, 26, 27, 23, 57, 38, 39, 42
Type: Autonomous			
Preparation of experiments	22	0.88	1, 2, 6, 8, 47, 48, 12, 11, 51, 26, 27, 21, 23, 25, 57, 4, 49, 31, 36, 37, 38, 40, 41, 39, 14, 42, 18, 52, 15

This course is structured in:

1. An informative session where the functioning of the subject and the laboratories will be presented to the students. It will be also insisted on the security measures to be followed and some fundamental aspects of the practices to be carried out.
2. Twelve laboratory sessions of 4 hours each. In these sessions, the synthesis and characterization of a series of organic products will be carried out. Prior to the beginning of the laboratory sessions, written tests (*prelabs*) will be carried out to evaluate the degree of comprehension and knowledge that the student has achieved preparing the experiment autonomously and the knowledge of the theoretical aspects related to the experiment.

The teacher will have to allocate approximately 15 minutes of some class to allow the students answering the surveys of evaluation of the educational performance and of the course subject or module.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attitude of the student, results of the experiments, skills and group management	20%	0	0	1, 2, 9, 7, 8, 47, 48, 13, 12, 44, 46, 51, 34, 26, 27, 21, 22, 23, 24, 25, 57, 20, 19, 45, 28, 4, 49, 30, 29, 31, 32, 37, 38, 35, 33, 41, 39, 42, 43, 16, 17, 18, 50, 59, 58, 54, 56, 55, 53, 15
written assessment tests	80%	4	0.16	1, 2, 3, 9, 5, 6, 7, 8, 47, 48, 10, 12, 11, 46, 51, 34, 60, 26, 27, 21, 22, 23, 25, 57, 4, 49, 31, 36, 37, 38, 33, 40,

The mark of this subject will consist of two parts:

Part 1. Written tests (contribution to the final mark = 80%). They consist of:

- *Prelabs*: tests prior to the realization of each experiment
- The laboratory notebook
- Reports that, eventually, were requested
- Final exam: Theoretical and practical questions and problems. A second chance exam will be scheduled for students who do not pass the first one. The final exam is the only part of the evaluation susceptible to recovery

Part 2: Others (contribution to the final mark = 20%). The following aspects will be evaluated:

- Attitude
- Experimental results
- Skills
- Group behavior

This part will not be recoverable.

QUALIFICATIONS

To pass the subject, students must meet the following requirements:

- Have obtained a mark equal to or greater than 5 out of 10 in the final exam
- Have obtained a mark equal to or greater than 5 out of 10 in the weighted average of both parts (1st and 2nd)
- In case of lack of attendance due to illness or other serious circumstance, that this has been duly justified with a medical certificate or adequate document. In no case may absences exceed one session (4 hours).

The *Honors Mention* may only be awarded to students who have obtained a grade equal to or greater than 9 points out of 10. Its number may not exceed 5% of the students enrolled in the subject (mrning + afternoon groups) in the corresponding academic year.

Non-qualifiable students: The students will receive the qualification of non-evaluable if they have not carried out any laboratory session or the final written exam or the second-chance exam.

IRREGULARITIES IN THE ASSESMENT TESTS

Without prejudice to other disciplinary measures deemed appropriate, the student who has committed irregularities that may lead to the variation of the grade of an evaluation act will be graded with a zero. Therefore, copying, plagiarism, cheating, letting copy, etc., in any of the evaluation activities, will imply grading it with a zero.

SAFETY WARNING IN THE LABORATORY

The student involved in an incident that could have serious safety consequences, because of negligent behavior, may be excluded from the laboratory and fail the subject.

Bibliography

Theoretical Concepts:

Organic Chemistry. Clayden, J.; Geeves, N.; Warren, S. 2nd Edition, 2012. ISBN: 978-0199270293 Oxford University Press.

Experimental Techniques:

Experimental Organic Chemistry: Standard and Microscale. Cranwell, P. B.; Harwood, L. M.; Moody, C. J. 3rd Edition, 2017. ISBN 10: 1119952387 ISBN 13: 9781119952381 John Wiley & Sons Inc.

Vogel's Textbook of Practical Organic Chemistry. Vogel, A.I.; Tatchell, A.R.; Furnis, B.S.; Hannaford, A.J.; Smith, P.W.G. 5th Edition, 1996. ISBN 10: 0582462363 / ISBN 13: 9780582462366 Prentice Hall Ed.

Software

Data Bases:

SciFinder- ACS

Spectral Data Base: https://sdbs.db.aist.go.jp/sdbs/cgi-bin/cre_index.cgi

Structures Drawing Program:

Marvin Sketch

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	1	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan	second semester	afternoon
(PLAB) Practical laboratories	4	Catalan	second semester	afternoon
(SEM) Seminars	1	Catalan	second semester	morning-mixed
(SEM) Seminars	2	Catalan	second semester	afternoon