Course guide
295503 - EXQ - Chemical Experimentation

Last modified: 04/06/2026

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: NÚRIA BORRÀS CRISTÒFOL

Others: Primer quadrimestre:
NÚRIA BORRÀS CRISTÒFOL - Grup: M1, Grup: T1
ANTONIO GÁMEZ LÓPEZ - Grup: M1, Grup: T1

REQUIREMENTS

QUÍMICA ANALÍTICA - Prerequisit
QUÍMICA ORGÀNICA - Prerequisit

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEQUI-21. Design and manage applied experimentation procedures, particularly for determining thermodynamic and transport properties, and the modelling of phenomena and systems in the field of chemical engineering, such as fluid flow systems, heat and mass transfer operations and the kinetics of chemical reactions and reactors.

Transversal:
04 COE N1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
07 AAT N2. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
06 URI N1. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

TEACHING METHODOLOGY

The course is experimental and is based on an active methodology and collaborative learning by students.
The experiment is scheduled to take place in sessions of 4 hours in the lab experiments that combine related to processes of synthesis and separation / purification of organic compounds with others related to the fundamentals and application of analysis and control compounds most common inorganic and organic chemical laboratory control.
The experiments were performed in pairs and are distributed so that each experiment is about to duplicate even with different samples on one hand to encourage teamwork between two couples that are formed in the working group and the other so they do not need many different experiments, making it easier for large groups.
Each experiment is associated with a pre-lab work, with the main objective that students take conscience of the experimental work to be done in the laboratory and the results expected of them. The objective of this pre-lab. is to prevent the students go to the lab without having read the explanation of the experiment, in addition to prevent the further it as if it were a receipt. At the beginning of the experimental session the teacher will check for this pre-lab for all groups.
During the lab sessions guide teachers encouraging the education work either clarifying questions about the handling of instrumentation or by asking questions, reviewing laboratory diary, etc. .. During this time the student intends to integrate the scientific method to solve the problems in each experiment and leading their own generic skills associated with the chemical laboratory as safe handling and management of reagents, materials and chemical residues.
At the end of the experimental sessions is to give students and post-lab. a number of questions relating to data and experimental results, allowing to reflect on what has been done and lay knowledge. The teacher returns it to the next meeting with the corresponding feedback.
To integrate the teamwork during the course, each 2 couples is in the working group, which aims to develop a course work related to the objectives of the course and allow you to extrapolate these to the industrial / environmental. Evidence of this work are a previous report and a final presentation and a poster format during a session at the end of the course or an oral presentation, where they have to summarize the main conclusions of the work, and it is also possible evaluate oral and written communication.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the students must be able to:
Apply synthesis techniques and chemical analysis
Solve problems involving the concepts of matter: water systems in equilibrium, synthesis and purification of organic compounds, determination and estimation of physicochemical properties, kinetic calculations, etc.
Communicate and transmit knowledge and skills in a multilingual and multidisciplinary environment
Teamwork in the field of chemical laboratory, fulfilling objectives of some complexity

STUDY LOAD

Type	Hours	Percentage
Hours small group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

PRESENTATION-FORMATION GROUPS SESSION

Description:
Presentation subject. Training groups (personality test) and introduction of the ingredients of teamwork. Assignment projectes

Full-or-part-time: 6h
Laboratory classes: 4h
Self study : 2h

GUIDED LABORATORI

Description:
Acquisition of a chemical laboratory skills through experimentation. Carrying out 10 experiments ruled in detailed script. Performing in the lab (in groups) experiments related to different qualitative and quantitative techniques of a chemical laboratory, where students apply them to the control samples and characterization of inorganic and / or organic. In addition carrying out of synthesis and purification of some compounds involving the use of techniques and methods common in a chemical laboratory, and some of calorimetry experiments and applying techniques of IR and NMR characterization in practical examples

Full-or-part-time: 64h
Laboratory classes: 32h
Self study : 32h

EXPERIMENTAL PROJECTE- DIRIGIT LABORATORI

Description:
Group project in which both the specific skills and generic assigned to the subject are integrated.
Part One: Planning and design experimentation necessary for the resolution of the problem. Support, guidance and monitoring by teachers throughout the project during the laboratory sessions.
Part Two: Performance the experiment in the laboratory in groups in the last sessions laboratory. Continued monitoring by tutor / s and in addition through virtual campus resource and other project management tools group. Development of memory written with previous versions to option to improvement. At the end of the course presentation of the main findings in poster format. Exposure joint session / discussion of posters to all groups of the subject

Full-or-part-time: 80h
Laboratory classes: 24h
Self study : 56h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

ASSESMENT QUALIFICATION: NT = 0,35*NL + 0,40*NP + 0,25* NInd.
NL: Laboratory mark (pre, post-laboratori, work in lab)
NP: experimental project mark (It includes the evaluations of each part: monitoring and execution of the project as well as presentation of the report and poster)
NInd: individual mark (monitoring teamwork and acquisition of specific competences)
There is no re-assessment exam.

BIBLIOGRAPHY

Basic:
- Aguilar Sanjuan, Manuel. Introducción a los equilibrios iónicos. 2ª ed. Bbarcelona: Reverté, 1999. ISBN 8429175504.
- Harris, Daniel C. Analisi quimica quantitativa [on line]. Barcelona: Reverté, 2006 [Consultation: 29/04/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6541. ISBN 9788429193671.
- Skoog, Douglas A. Análisis instrumental. 4ª ed. México D.F. [etc.]: McGraw-Hill, 1994. ISBN 9684226241.
- Atkins, P. W. Química física. 8a ed. Buenos Aires [etc.]: Médica Panamericana, cop. 2008. ISBN 9789500612487.
- Keese, R. Métodos de laboratorio para química orgánica. México [etc.]: Limusa, 1990. ISBN 9681834011.

RESOURCES

Audiovisual material:
- videos de tecniques de treball al laboratori. Resource
- videos Tècniques bàsiques al laboratori. Different videos on basic laboratory techniques: weighing, measuring of volumes, preparation of solutions, volumetric, distillation, extraction, filtraccion
- videos de tecniques avancades al laboratori. videos de tecniques avancades al laboratori: espectrofotometria UV-Vis, Absorció Atomica, Espectroscopia IR, Cromatografia