Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

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

COURSE

25115 - Chemical Engineering **Credits, ECTS:** 6

COURSE DESCRIPTION

This subject introduces the students to the industrial aspects of Chemical Engineering and it gives them the basic knowledge and skills to analyze, design and operate basic equipment in the chemical industry.
Contents include concepts such as basic operation, property balances and the mathematical modeling of chemical reactors.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The competences the student must acquire are:
-Capacity to apply the basic principles of Chemistry in the study of industrial chemical processes.
-Ability to present subjects in the chemical engineering area, in a comprehensible way.
-Capacity to search and select relevant information in the chemical and scientific fields, employing paper and electronic bibliography.
-Ability to relate the chemistry knowledge with other scientific fields and evaluate the impact of chemistry and the chemical industry in the modern world.

The Grade Coordination Commission will guarantee the coordination of this subject with the other ones within the Grade in Chemistry.

Theoretical and Practical Contents

1.-Introduction: Chemical engineering. Processes and operations in the chemical industry.
2.-Material balances: Mass transfer mechanisms. Phase equilibrium. Binary and flash distillation. Multistage rectification.
3.-Energy balances: Enthalpy and energy balances. Heat transfer by conduction and convection. Heat exchangers.
4.-Non compressible fluids flow: Viscosity and flow regime. Friction and energy loss. Fluid flow in pipes.
5.-Chemical reactors: Chemical kinetics. Ideal reactor design. Batch and continuous-flow reactors. Reactor combinations.

TEACHING METHODS

The subject includes on-site classes with the teacher and seminars where the student must solve and discuss problems on chemical engineering. In the first semester, Problem Based Learning will be implemented.

TYPES OF TEACHING

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

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 50%
- Exercises, cases or problem sets 45%
- Teamwork assignments (problem solving, Project design) 5%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation of the subject will be done by written exams (50%) and by resolution of exercises carried out in groups (50%).
At the end of the first semester, a partial exam can be written. This exam will have a theoretical (50%) and a practical (50%) part. In order to make the average, a minimum mark of 3 should be obtained in each part. If this partial exam is passed, the subjects corresponding to this part will no be evaluated again in the final exam.
The final mark will be the average of the marks obtained in each semester, if a minimum of 4 has been obtained in the exam of each of them.

In order to obtain a "non-presented" mark, it is enough not to assist to the final exam.
If the student wants to write a final exam with a value of 100% of the mark, it will have to be asked to the teacher before the 18th week of the course.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Written exam with a value of 100%. This exam will have a theoretical (50%) and a practical (50%) part. In order to make the average, a minimum mark of 3 should be obtained in each part.
If a student does not appear to this exam, a "non-presented" mark will be given.

MANDATORY MATERIALS

It will be said at the beginning of the course.

BIBLIOGRAPHY

Basic bibliography

G. Calleja (Ed.): "Nueva introducción a la Ingeniería Química" (2 vol.). Ed. Síntesis (Madrid, 2016).
J.M. Santamaría y cols.: "Ingeniería de los reactores". Ed. Síntesis (Madrid, 1999).
O. Levenspiel. "Ingeniería de las reacciones químicas". Ed. Reverté. 2000.
O. Levenspiel: "Flujo de Fluidos e intercambio de calor". Ed. Reverté (Barcelona, 1998).

Detailed bibliography

J.M. Coulson y J.F. Richardson: "Ingeniería Química (varios volúmenes)". Ed. Reverté.
R.B. Bird. "Fenómenos de transporte". Ed. Reverté. 1976.
W.L. McCabe, J.C. Smith. "Operaciones básicas de la Ingeniería Química". Ed. Reverté. 2007.
R. Perry. "Manual del Ingeniero Químico" 8ª Edición, 2008.

Journals

Chemical Engineering Journal: https://www.journals.elsevier.com/chemical-engineering-journal
Education for Chemical Engineers: https://www.journals.elsevier.com/education-for-chemical-engineers
Chemical Engineering Educators: http://journals.fcla.edu/cee

Web sites of interest

https://www.industriaquimica.es/
http://www.chemengonline.com/

OBSERVATIONS