UAB
Universitat Autònoma de Barcelona

Projects and Safety

2026/2027

Code: 102434
Credits: 6

Degree programme	Type	Course
Chemical Engineering	OB	4

Contact lecturer

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Teaching staff

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Group languages

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

Prerequisites

It is necessary to know Catalan because the classes are in this language.

Reactors, Separation Operations, Fluid Circulation, Heat Transmission, Controland Process and Product Engineering subjects should be coursed

Objectives

The subject consists of two parts with clearly differentiated objectives.

Part I: Projects

Know the different phases of a chemical project and understand a project report. Know how to carry out the temporary programming of tasks and the analysis of economic profitability of a project.

Part II: Safety

Know how to evaluate industrial risks through tools such as FTA and with the knowledge of the current regulations, the properties of the substances, and the possible situations of danger that can be found in a plant.

Learning outcomes

1. Identify the different phases of a project.
2. Select the adequate methodology to resolve common problems in project development.
3. Identify the structure and contents of project reports.
4. Analyse a project report.
5. Organise and determine the necessary human resources to perform different tasks and cater for different needs in a project.
6. Recognise the main factors involved in the economic evaluation of a chemical engineering project.
7. Apply different methods to estimate the mentioned factors.
8. Evaluate the economic feasibility of a chemical engineering project.
9. Apply chemical engineering to the resolution of energy problems.
10. Apply chemical engineering to the prevention of environmental and energy problems in accordance with the principles of sustainable development and applied to the different production processes of the main inorganic and organic products in the different sectors of industrial chemistry.
11. Apply the main concepts of safety and hygiene in the workplace.
12. Identify and evaluate industrial irrigation.
13. Apply the basic concepts of industrial hygiene.
14. Define the concept of risk prevention by means of its analysis applied to industry.
15. Aplicar la normativa i la legislació en seguretat, higiene i risc industrial.
16. Describe and explain how to complete studies and reports in the field of chemical engineering.
17. Produce environmental evaluation reports on processes and activities while applying tools such as environmental impact and lifecycle assessments.
18. Develop a capacity for analysis, synthesis and prospection.
19. Manage available time and resources. Work in an organised manner.
20. Prevent and solve problems.
21. Make one's own decisions.
22. Work in complex or uncertain surroundings and with limited resources.
23. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
24. Efficiently use ICT for the communication and transmission of ideas and results.
25. Critically evaluate the work done.

Contents

Students will have access to the teaching material of the subject through the Moodle platform.

It will progress in the content of the two parts of the subject in parallel.

Part I: Projects

1. Project engineering

1.1. Project

1.1.1. Phases of a project

1.2. Project engineer

1.3. Synthesis of plausible alternatives. Case example

2. Project report

2.1.Project specifications

2.1.1.Definition of the project

4. Economic evaluation

4.1. Company and capital

4.2. Estimated fixed assets

4.2.1. Global methods

4.2.2. Single factor methods

4.2.3. Multiple factor methods

4.2.4. Estimation of equipment costs

4.3. Estimation of working capital

4.4. Costs

4.5. Sales

4.6. Profitability analysis

4.6.1. Percentage yield

4.6.2. Time value of money

4.6.3. Net Present Value

4.6.4. Internal Rate of Return

4.6.5. Selection of investment alternatives

Part II: Safety

1. Introduction to the subject, objectives and backgrounds of risk analysis, industrial and occupational risk management system, and process safety.

2.- Introduction to the world of controlled environments and Clean Rooms (CLEAN ROOM), design, regulations and applications.

3.- Introduction to the ATEX CEI-EN 60079-10 directive for explosive atmospheres.

4. Regulations and legislation: REACH, signage, storage of chemical and petroleum products. Transport of dangerous substances. ADR and others.

5. Hazardous chemical substances. Dangerous properties of products. Identification Safety files. Personal protection equipment and equipment

6. The fire. Fire chemistry Characteristics and properties of fuels. Focus of ignition. Combustion products and their effects on the safety of people. Prevention and protection against fires, extinguishing agents and suppression systems. Explosions - characteristics, types.

7. Risk analysis. Risk definition Quantitative and Qualitative Methods: FTA, Hazop, Dow Index. Risk Tolerability Criteria, Probit method.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Projects:Public defense of a Final Project Report	3	0.12	
Projects: Study of the concepts and problem sets solving	50	2	
Safety: Study of the concepts and problem sets solving	40	1.6	
Safety: Theory and problems lectures	17	0.68	
Projects: Theory and problems lectures	23	0.92	
Projects: Study and preparation of the defense of a project's report	10	0.4	

Theory and problems lectures: As you progress in the syllabus, problems of the subject will be considered and resolved.

Report defenses: Partial aspects of some project reports, corresponding to Final Degree Projects deposited in the UAB Digital Repository of Documents, will be defended in public.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Public defense of a Final Project	12%	0	0	3, 4, 16, 19, 22, 23, 24, 25
Final Exam of Safety	40%	3	0.12	9, 10, 11, 12, 13, 14, 15, 17, 18, 20
Partial 2 Exam of Projects	24%	2	0.08	2, 6, 7, 8, 18
Partial 1 Exam of Projects	24%	2	0.08	1, 2, 5, 18, 21

The subject consists of two parts that will be assessed independently. The final mark will be the weighted average, provided that a grade greater than or equal to 4/10 has been obtained in each of the parts. In the event that the mark is less than 4/10 in one part, the weighted average will also be made but will not be approved for compensation and the mark obtained will be a maximum of 4/10.

To participate in the retake exam, the students must have previously been evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject. Therefore, students will obtain the \"Not Evaluable\" qualification when the assessment activities carried out have a weighting of less

than 67% in the final grade.

A special distinction (MH) can be given from the 9/10 qualification with the limitation of up to 5% of MH of the total number of students enrolled.

Without prejudice to other disciplinary measures that may be considered appropriate, the irregularities (copy, plagiarism, deception, letting copy, etc.) committed by the students that may lead to a variation of the qualification of an evaluation activity will lead to suspend them with a zero.

The repeating students will have the same system of continuous evaluation.

For each evaluation activity, a place, date and time of review will be indicated. If the student does not appear, it will not be reviewed later.

Part I: Projects (60% of the note):

Public exhibition of final project reports (COMPULSORY PROOF): A final degree project, previously studied / prepared, from previous courses will be presented, working in group. Compulsory proof includes the attendance and evaluation of other groups presenting in the same date that the own one (20%)

Partial 1: A partial exam will be made of the subject matter corresponding to Unit 3. (40%)

Partial 2: A partial exam will be done on the subject corresponding to Unit 4. (40%)

Retake exam: If the resultant qualification of the tests carried out in part I of the subject is less than 5/10, students can do a second exam of the the partial ones that have not been passed.

Part II: Safety (40% of the note):

There will be a single exam for this part of the subject. Students with a note below 5/10 can submit to a retake final test with a maximum grade of 7/10. The retake test can be a written, oral or a working paper exam propertly announced when the exam notes are published.

This subject does not provide for the single evaluation system.

In the assessment activities of this subject, the use of Artificial Intelligence (AI) technologies is not allowed and will be considered a lack of academic honesty, leading to a partial or total penalty in the grade of the activity.

Bibliography

Part I: Projects

Lawson G., Wearne S., Iles-Smith P. " Project management for the process industries". Institution of Chemical Engineers, Rugby, 1999.

Valle-Riestra J.F. "Project evaluation in the chemical process industries", McGraw-Hill, New York, 1983

Vian A. "El pronóstico económico en química industrial", Eudema, Madrid, 1991.

Happel J., Jordan D.J., \"Economía de los procesos químicos\", Ed. Reverté, Barcelona, 1981.

Allen D.H., "Economic evaluation of projects", Institution of Chemical Engineers, 3a ed., Rugby, 1991

Couper J. R., "Process Engineering Economics", Marcel Dekker, New York, 2003

Sinnot R., Towler G., "Diseño en Ingeniería Química", Ed Reverté, Barcelona, 2012

Part II: Safety

There are three libraries or public documentation centers in which you can find bibliographical funds on specially recommended security topics: the library of the National Center for Safety and Health at Work in Barcelona; the Library of the Association / College of Industrial Engineers; and the Library of Sciences and Engineering of the Autonomous University of Barcelona.

Crowl, Daniel A. Chemical process safety : fundamentals with applications / Daniel A. Crowl, Joseph F. Louvar. Edició 2nd ed. Publicació Englewood Cliffs : Prentice-Hall, cop. 2002

Fernando Díaz Alonso . Explosiones industriales : análisis de consecuencias y distancias de seguridad. Editorial Académica Española (2011).

Joaquim Casal i altres. Anàlisi de risc en instal.lacions industrials. Edicions UPC. BCN. (1996).

J. M. SantamaríaRamiro, i , P. A. Braña Aísa. Análisis y reducción de riesgos en la industria química. Fundación Mapfre. Madrid. (1994) 2ona edició 1998.

CCPS and American Institute of Chemical Engineers.Guidelines forChemical Process Quantitative Risk Analysis. Second edition. AIChe. NY. (2000).

Sistema de gestión de riesgos laborales e industriales. Burriel, G., Editorial Mapfre

Manual de Higiene Industrial. Fundación Mapfre. 3arta edició (1996).

Manual de Seguridad en el Trabajo. Fundación Mapfre. Madrid. (1992)

Risk assessment and risk management for the chemical process industry. Harris R. Greenberg Joseph J. Cramer. NY. (1991).

Skelton, B. Process Safety Analysis. An Indtroduction. Gulf Publishin Co. Houston.

Kolluru, R., et al. Risk Assessment and Management Handbook: for Environmental, Health and Safety Professionals. Mc Graw-Hill, NY (1996).

NFPA 921:guía para las investigaciones sobre incendios y explosiones ; [traducción: Alfonso Alarcón ; revisión técnica ITSEMAP Servicios Tecnológicos MAPFRE, S.A.] Guía para las investigaciones sobre incendios y explosiones. Madrid. (1996). 614.84 NFP.

Storch de Gracia, J. M. Manual de seguridad industrial en plantas químicas y petroleras. Fundamentos, evaluación de riesgos y diseño. McGraw-Hill/Interamericana de España SAU. (1998).

CCPS. Guidelines for Use of Vapor Cloud Dispersion Models. 2ona ed. AIChe. N.Y. (1996).

Guidelines for Hazard Evaluation procedures. AIChe. NY. (1985)

NFPA. Manual de protección contra incendios. Editorial Mapfre. 4arta ed. (1993)

Índices de riesgo de procesos químicos: metodología de autoevaluación. Instituto Nacional de Seguridad e Higiene en el Trabajo.

Fire & explosion index: hazard classification guide. AIChe. NY.(1981).

DOW'S FIRE & EXPLOSION INDEX HAZARD CLASSIFICATION GUIDE

DOW'S CHEMICAL EXPOSURE INDEX GUIDE

Fichas de divulgaciónnormativa. Instituto Nacional de Seguridad e Higiene en el Trabajo. Madrid. Serie 1, serie 2, serie 3. (1996)

Cepreven.Diseño e instalación de sistemas de extinción de incendios que utilizan gases inertes no licuados. Madrid (1998). 699.81 Dis.

Software

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Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	21	Catalan	second semester	afternoon
(PAUL) Classroom practices	211	Catalan	second semester	afternoon
(SEM) Seminars	211	Catalan	second semester	afternoon