UAB
Universitat Autònoma de Barcelona

Projects and Safety

Code: 102434
ECTS Credits: 6

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Degree	Type	Year
2500897 Chemical Engineering	OB	4

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this 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 and Contextualisation

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.

Competences

- Analyse the economic feasibility of an industrial chemical engineering project.
- Analyse, evaluate, design and operate the systems or processes, equipment and installations used in chemical engineering in accordance with certain requirements, standards and specifications following the principles of sustainable development.
- Apply one's knowledge when performing measurements, calculations, estimations, evaluations, assessments, studies, reports and other similar tasks.
- Apply quality principles and methods.
- Demonstrate knowledge of the standards, legislation and regulations applicable to each situation.
- Evaluate, in a structured and systematic manner, the health and safety risks in an existing process or one in design phase, and apply the suitable measures to each situation.
- Objectively compare and select different technical options for chemical processes.
- Work in a team.

Learning Outcomes

1. Aplicar la normativa i la legislació en seguretat, higiene i risc industrial.
2. Apply different methods to estimate the mentioned factors.
3. Apply knowledge to the preparation of related documentation, organised by work processes and procedures.
4. Apply the basic concepts of industrial hygiene.
5. Apply the knowledge required to perform the calculations required for a chemical engineering project.
6. Apply the main concepts of safety and hygiene in the workplace.
7. Define the concept of risk prevention by means of its analysis applied to industry.
8. Describe and explain how studies and reports should be carried out in the field of chemical engineering.
9. Evaluate the economic feasibility of a chemical engineering project.
10. Identify and evaluate industrial irrigation.
11. Identify the different phases of a project.
12. Organise and determine the necessary human resources to perform different tasks and cater for different needs in a project.
13. Produce environmental evaluation reports on processes and activities while applying tools such as environmental impact and lifecycle assessments.
14. Recognise the main factors involved in the economic evaluation of a chemical engineering project.
15. Select the adequate methodology to resolve common problems in project development.
16. Work cooperatively.

Content

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

2.1.2. Description of the manufacturing process

2.1.3. Establishment of the plant

2.1.4. Specifications and needs of services at the plant boundary

2.2. Equipment

2.2.1 Team list

2.2.2.Total specifications

2.3. Instrumentation and control

2.3.1.List of instruments and control

2.3.2.Description and diagrams of control loops

2.3.3.Specification sheets

2.4. Pipes, valves and accessories

2.4.1. Description of pipes, valves and accessories

2.4.2. List of pipes, valves and accessories

2.4.3. Specification Sheets

2.5. Safety and Hygiene

2.6. Environmental treatments

2.7. Economic evaluation

2.8. Start-up of the plant

2.9. Operation of the plant

2.10.Diagrams and drawings

2.11.Manual calculations

2.12. Properties and design data

2.13. Bibliography

3. Temporary programming

3.1. Bar chart

3.2. Critical Path Method (CPM)

3.3. Acceleration of activities

3.4. Human resources

3.4.1. Resource planning

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.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Projects: Theory and problems lectures	23	0.92	2, 9, 12, 14
Projects:Public defense of a Final Project Report	3	0.12	12
Safety: Theory and problems lectures	17	0.68	1, 4, 6, 7, 10, 13
Type: Autonomous			
Projects: Learnig by using a software , open acces, to solve temporary programming problem	5	0.2	12
Projects: Study and preparation of the defense of a project's report	10	0.4	12
Projects: Study of the concepts and problem sets solving	45	1.8	2, 9, 12, 14
Safety: Study of the concepts and problem sets solving	40	1.6	1, 4, 6, 7, 10, 13

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.

Important note: the proposed teaching methodology may undergo some modification depending on the restrictions on attendance imposed by the health authorities.

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
Final Exam of Safety	40%	3	0.12	1, 4, 6, 7, 10, 13
Partial 1 Exam of Projects	18%	2	0.08	5, 8, 11, 12, 15
Partial 2 Exam of Projects	24%	2	0.08	2, 5, 8, 9, 14, 15
Public defense of a Final Project	12%	0	0	3, 8, 12, 16
Temporary programming in OpenProj	6%	0	0	12

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%)

Temporary programming in OpenProj: A problem of temporary programming of tasks carried out with the software OPenProj will be presented. (10%)

Partial 1: A partial exam will be made of the subject matter corresponding to Unit 3. (30%)

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.

Important note: the proposed teaching evaluation may undergo some modification depending on the attendance restrictions imposed by the health authorities.

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.

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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).

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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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Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	211	Catalan	second semester	morning-mixed

(SEM) Seminars	211	Catalan	second semester	morning-mixed
(TE) Theory	21	Catalan	second semester	morning-mixed