PERSONA CIÈNCIA EMPRESA
UNIVERSITAT RAMON LLULL

COURSE: PROJECT I

SUBJECT: Project I
MODULE: Process and Product Engineering
STUDIES: MASTER IN CHEMICAL ENGINEERING

GENERALES FEATURES

Type: ☐ Basic training, ☑ Mandatory, ☐ Elective
☐ Master thesis, ☐ Internship

Duration: Semestral **Semester/s**: 1
Number of ECTS: 6
Language/s: English, may include sessions in Spanish.

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION

Project engineering is just one facet of the professional activity of chemical engineers. It is, however, the discipline that offers the opportunity to learn more ways, more varied and – sometimes – in greater depth what are chemical and related facilities. The project implementation has shown for years in IQS its power as a learning tool and has been for many students a real life experience.

Thus, the subjects of Project I and II are the basis on which all the methodology of the master is constructed and fully follow a project-based methodology.

The results of this first course – Project I – have to be the specifications of the process and its components. To do this, it will coordinate with the development of the courses on Processes and products, Functional design, Simulation and optimization of processes, Fluid Dynamics, Industrial Safety, Project Management, Innovation and information management and Costs and business economics. It will include specialist's seminars on issues related to project development and visits to industrial sites.

SKILLS

- CB6 – The student has knowledge and understanding of what constitutes a basis or an opportunity to be original by developing and/or applying ideas, often in a research context.
- CB7 – The student can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to his/her field of study.
- CB8 – The student is able to integrate knowledge and handle complexity involving judgments based on incomplete or limited information, including issues on social and ethical responsibilities linked to the application of his/her knowledge and judgments.
- CB9 – The student can communicate their conclusions and their knowledge and technical/scientific basis to specialists and non-specialists in a clear and unambiguous way.

- CB10 – The student has learning abilities enabling him/her to continue studying in a way that will be largely self-directed or autonomous.
- CG1 - The student can design, manage, execute and expose a project.
- CT1 – The student is able to communicate effectively both orally and in writing with specialized partners and with non-specialized audiences in the field of Chemical Engineering.
- CT2 – The student is able to communicate in English and use English as a working language in the field of Chemical Engineering.
- CT3 – The student is able to work in multidisciplinary environments, individually or as a team member.
- CT4 – The student has ability to lead and manage working teams in the field of Chemical Engineering.
- CT5 – The student is able to assess the impact of Chemical Engineering in the sustainable development of society.
- CT6 – The student is able to develop learning abilities, which are needed to undertake further activities, and to recognize the need for continuing education to maintain an appropriate professional development.
- CT7 – The student is able to make a responsible practice of the profession of Chemical Engineering, incorporating ethical and deontological subjects to work responsibly in a professional environment.
- CE1 – The student is able to apply knowledge of mathematics, physics, chemistry, biology and other natural sciences – obtained through study, experience and practice – with critical reasoning to establish economically viable solutions to technical problems.
- CE2 – The student can design products, processes, systems and services for the chemical industry as well as optimize other already developed, on the technological basis the various areas of Chemical Engineering, involving processes and transport phenomena, separation operations and reactor engineering, both chemical and nuclear, electrochemical or biochemical.
- CE3 – The student can conceptualize engineering models, apply innovative methods in problem solving and use suitable software for the design, simulation, optimization and process and system control.
- CE4 – The student has the ability to solve problems that are unfamiliar, incompletely defined, and have contradictory specifications, considering the possible methods of solution, including the most innovative, selecting the most appropriate, being able to correct implementation and evaluating the different design solutions.
- CE5 – As a professional, the student is able to manage and supervise all kinds of facilities, processes, systems and services in different industrial areas related to Chemical Engineering.
- CE6 – The student can design, build and implement methods, processes and systems for integrated management of supplies and wastes - solid, liquid and gaseous – in industries, being capable of assessing their impact and their risks.

PREREQUISITES

Admission to the Master in Chemical Engineering of the Universitat Ramon Llull.

CONTENTS

1. Definition of the process to develop.
2. Conceptual design.
3. Material and energy balances.
4. Hazard and operability analysis.
5. Process optimization.

METHODOLOGY

TRAINING ACTIVITIES

Training activities	ECTS	Skills
Concept sessions.	0,58	CB6
Sessions solving exercises, problems and cases.	0,58	CB7, CB8 CE1, CE2, CE3, CE4, CE6
Seminars and visits to industries.	1,16	CT5, CT6, CT7 CE5, CE6
Practical work / projects / laboratory.	2,95	CB8, CB10 CG1 CT2, CT3, CT4, CT5, CT6, CT7 CE1, CE2, CE3, CE4, CE6
Presentations.	0,04	CB9 CT1, CT2, CT5
Personal study activities of students.	0,62	CB6, CB7, CB8, CB9, CB10 CT6, CT7 CE1, CE2, CE3, CE4
Evaluation activities.	0,07	CB6, CB7, CB8, CB9, CB10 CT1, CT2, CT5, CT7
TOTAL	**6,00**	

EXPLANATION OF THE TEACHING METHODOLOGY

This course forms a full set with Project II. Both of them are fully deployed applying a project-based methodology. Project I essentially contains the elements of the conceptual engineering and basic engineering of any industrial project. The subject of Project I is developed in conjunction with the courses of Project management, Processes and products, Functional design, Simulation and process optimization, Fluid dynamics and Safety, which set the foundation for deploying each of the phases of the project.

A few sessions will be devoted to the exhibition of basics about the implementation of projects of chemical and/or related (food, biotechnology, ...) facilities. From the first day, students will be organized in teams and receive the order to execute a project (Chemical Engineering Design). Seminars and visits to companies will be the main contact of students

with the real industrial world where chemical engineers deploy their activity. There will be two types of seminars, some of them - what could be called "internal" – are dedicated to monitoring and improving the project. Others are taught by specialists of various techniques and disciplines related to industrial facilities – i.e. pumps, valves, sensors, control systems, effluent treatment systems, steam circuits, ... –. Each team will present its results periodically well in private sessions with the professors, either in joint sessions with the other students. Each team must expose its project in the state remaining at the end of the course to the rest of students in a joint session.

The course will be given essentially in English.

EVALUATION

ASSESSMENT METHODS

Methods of evaluation	Weight	Skills
Monitoring activities.	15 – 25%	CB6, CB7, CB8, CB9 CG1 CT1, CT2, CT3, CT4 CE1, CE2, CE3, CE4, CE5, CE6
Homework and presentations.	5 – 15%	CB9, CB10 CT1, CT2, CT5, CT6, CT7
Projects	55 – 65%	CB6, CB7, CB8, CB9 CG1 CT3, CT7 CE1, CE2, CE3, CE4, CE5, CE6
Participation	10%	CB10, CT5, CT6

LEARNING OUTCOMES

Students will develop:

- Knowledge allowing to perform original developments.
- Skills in problem solving in new environments.
- Ability to integrate knowledge and formulate judgments with incomplete or limited information.
- Ability to communicate its conclusions in a reasoned manner.
- Ability of autonomous learning.
- Ability to manage a project.
- Ability to apply their knowledge to establish economically viable solutions.
- Ability to design processes, systems and services for the chemical and related industries.
- Ability to optimize processes, systems and services for the chemical industry.
- Ability to develop engineering models.
- Skills in the use of innovative methods in problem solving.
- Ability to solve problems that are unfamiliar, incompletely defined or have competing specifications.
- Ability to supervise facilities, processes, systems and services industry.
- Ability to design methods, processes and systems for integrated management of supplies and waste in the industry.
- Ability to communicate effectively.
- Ability to use English regularly.

- Ability to work in multidisciplinary teams.
- Ability to lead teams.
- Ability to assess the impact of their designs and projects on sustainable development.
- Ability to value continuing education.
- Ability to develop a responsible practice of their profession.

EVALUATION

Monitoring activities learning of this subject consist of written controls and on individual and/or group interviews on issues related to the project. Their weight on the final grade is between 15 and 20%, setting the particular value at the beginning of the course.

Homework and presentations have in this case, a range between 5 and 15%. They consist in small works in aspects related to the project and their exposition in joint seminars.

The rating of the projects' section is obviously the most important subject, weighing between 55 and 65% of the final grade.

The rating for participation is obtained from the intervention of students in forums, seminars, visits and interviews. It constitutes 10% of the final grade.

EVALUATION OF SKILLS

Skills assessment will be made as indicated in the table of Assessment methods.

BIBLIOGRAPHY

Textbook:

- Sinnott, Ray K. and Towler, Gavin. Chemical Engineering Design (SI Edition). 5th Edition 2009 (reprint 2012). Elsevier: Butterworth-Heinemann.

Other:

- H. Baron. The Oil & Gas Engineering Guide. Éditions Technip. París 2010.
- Ullmann's encyclopedia of industrial chemistry : volumes A1-A28: alphabetically arranged articles / executive editor Wolfgang Gerhartz ; editors F. Thomas Campbell, Rudolf Pfefferkorn, James F. Rounsaville. 5th. completely rev. ed. VCH Verlagsgesellschaft, 1985-1996. Edición electrónica a través de la Biblioteca de IQS.
- Encyclopedia of chemical processing and design / executive editor John J. McKetta; Marcel Dekker, New York 1976-1999.
- Perry's chemical engineers' handbook. 8ª edición. McGraw-Hill, New York 2007
- R. Turton, J. A. Shaeiwitz, D. Bhattacharyya, W. B. Whiting. Analysis, Synthesis, and Design of Chemical Processes, 5/E (Juny 22, 2018). Prentice Hall

DOCUMENT RECORD

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J. Sempere. 11/04/2013

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