



PERSONA CIÈNCIA EMPRESA
UNIVERSITAT RAMON LLULL

COURSE: SIMULATION AND OPTIMIZATION OF PROCESSES

MATTER: Simulation and optimization of processes
MODULE: Process and Product Engineering
PROGRAM TITLE: Master in Chemical Engineering

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GENERAL CHARACTERISTICS

Type: Basic training, Compulsory, Elective
 Master thesis Internship

Duration: Half-yearly

Semester/s: 1

Number of ECTS credits: 3

Language/s: Spanish, may include sessions in English or Catalan.

DESCRIPTION

SHORT DESCRIPTION AND JUSTIFICATION

The future Masters will acquire the ability to plan and perform process simulation both in steady state as transient, regardless of the software used.

Special emphasis on aspects of integrating knowledge of this matter will be made, in order to the students acquire a significant capacity for synthesis.

The ability of students to use multiple computing resources to solve the problem of simulation and optimization will be developed.

COMPETENCES

- 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.
- CG1 - The student can design, manage, execute and expose a project.
- 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.



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- 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.

PREREQUISITES

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

CONTENTS

1. Heat integration and network design
2. Optimization: factorial and sequential designs, empirical modeling
3. Dynamic simulation of chemical processes
4. Simulation of systems in engineering
 - 4.1. System dynamics
 - 4.2. Discrete events
 - 4.3. Agent based

METHODOLOGY

LEARNING ACTIVITIES

Learning activities	ECTS Credits	Competences
Lectures	0,72	CB6
Case and Problem-Solving Sessions	0,28	CB7, CE1, CE2, CE3
Seminars	0,04	CB6, CE3
Practical & Lab Work	0,29	CG1, CE1, CE2, CE3
Personal study	1,63	CB6, CB7, CE1, CE2, CE3
Assessment Tasks (Exams, Continuous Assessment...)	0,04	CB6, CB7
TOTAL	3,00	

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TEACHING METHODOLOGY

This course uses the following teaching methodologies:

- Presentation or explanation of contents (possibly including demonstration) by a professor.
- Solving exercises, approach / problem solving and presentation / discussion of cases by a professor with the active participation of students.
- Teaching by a professor in order to review, discuss and resolve questions about the materials and topics presented in sessions and exhibition concepts in solving sessions exercises, problems and cases. It includes visits to companies and facilities.
- Personal work of the student to acquire the skills of each subject.
- Oral or written tests to assess skills acquired.

Is necessary to have a laptop for this course.

ASSESSMENT

ASSESSMENT METHODS

Assessment methods	Weight	Competences
Final Exam	40%	CB6, CB7, CE1, CE2, CE3, CE4
Continuous Assessment Activities	40%	CB6, CB7, CG1, CE1, CE2, CE3, CE4
Lab or Field Work	20%	CB6, CB7, CG1

LEARNING OUTCOMES

The student will have acquired:

- Knowledge that give the basis or opportunity to be original in the development and / or implementation of ideas.
- Ability to apply knowledge acquired.
- Ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- Ability to design and carry out a project.
- Ability to apply their knowledge with critical thinking to establish economically viable solutions to technical problems.
- Ability to design processes, systems and services of the chemical industry and related.
- Ability to formulate engineering models, apply innovative methods in problem solving and appropriate software for the design of processes and systems applications.

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QUALIFICATION

The final exam of the subject is worth 40% of the final grade. To pass the course it is required a grade greater than or equal to 4.5 points. Otherwise the final grade is the qualification of the final exam.

Continuous Assessment Activities of this course consist of written tests. His weight on the set of the final grade is 40%.

Lab or Field Work have in this case a weight of 20%. Related aspects of the project or other specific work activities, delivered on the digital platform of the institution are carried out. It is required to pass this part to pass the course.

In subsequent calls, the same qualification criteria are maintained.

ASSESSMENT OF THE COMPETENCES

Skills assessment will be made according to the percentages indicated in the table of evaluation methods.

BIBLIOGRAPHY

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- Cha, P.D., Rosenberg, J.J. y Dym, C.L.; Fundamentals of Modeling and Analyzing Engineering Systems; Cambridge University Press, Cambridge (UK) 2000 (ISBN 0-521-59463-4)
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- Banks, J., Carson, J., Nelson, B.L. y Nicol, D.; Discrete-event System Simulation; 5th edition (July 2009); Prentice Hall (ISBN: 978-0136062127)

DOCUMENT HISTORY

PREVIOUS REVISIONS

October, 9, 2017, Dr. José Javier Molins

November, 29, 2016, Dr. José Javier Molins

November, 30, 2015, Dr. José Javier Molins

November, 14, 2013, Dr. José Javier Molins

CURRENT REVISION

October, 3, 2018, Dr. José Javier Molins