

Course guide

240EQ034 - 240EQ034 - Advanced Design of Chemical Processes

Last modified: 26/06/2025

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: **Academic year:** 2025 **ECTS Credits:** 4.5
Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: ANTONIO ESPUÑA CAMARASA
Others: Primer quadrimestre:
ANTONIO ESPUÑA CAMARASA - T10

PRIOR SKILLS

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REQUIREMENTS

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DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Conceptualize engineering models; apply innovative methods in problem solving and applications suitable for the design, simulation, optimization and control of processes and systems.
3. Designing products, processes, systems and services for the chemical industry as well as the optimization of other already developed technology based on various areas of chemical engineering, understanding of processes and transport phenomena, separation operations and engineering chemical reactions, nuclear, electrochemical and biochemical.
4. The student will be able to analyze the economic feasibility of a chemical engineering project.

Generical:

5. Possess independent learning skills to maintain and enhance the competencies of chemical engineering to enable the continued development of their profession.
2. Know how to establish and develop mathematical models using appropriate informatics, scientific and technological basis for the design of new products, processes, systems and services, and for other already developed optimization.

TEACHING METHODOLOGY

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LEARNING OBJECTIVES OF THE SUBJECT

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STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	24.00
Hours small group	13,5	12.00
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

Introduction - Calculation tools - Simulation and optimization

Full-or-part-time: 14h

Theory classes: 2h

Practical classes: 2h

Self study : 10h

Analysis of processes

Related competencies :

CGMQ5. Know how to establish and develop mathematical models using appropriate informatics, scientific and technological basis for the design of new products, processes, systems and services, and for other already developed optimization.

CEMQ14. The student will be able to analyze the economic feasibility of a chemical engineering project.

Full-or-part-time: 14h

Theory classes: 4h

Practical classes: 2h

Self study : 8h

Synthesis and optimization of reaction systems

Description:

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Related competencies :

CGMQ5. Know how to establish and develop mathematical models using appropriate informatics, scientific and technological basis for the design of new products, processes, systems and services, and for other already developed optimization.

CEMQ3. Conceptualize engineering models; apply innovative methods in problem solving and applications suitable for the design, simulation, optimization and control of processes and systems.

CEMQ2. Designing products, processes, systems and services for the chemical industry as well as the optimization of other already developed technology based on various areas of chemical engineering, understanding of processes and transport phenomena, separation operations and engineering chemical reactions, nuclear, electrochemical and biochemical.

CEMQ14. The student will be able to analyze the economic feasibility of a chemical engineering project.

Full-or-part-time: 54h

Theory classes: 8h

Practical classes: 24h

Self study : 22h



Process Intensification

Description:

content english

Full-or-part-time: 8h

Theory classes: 2h

Self study : 6h

Global vision: integration of processes

Related competencies :

CGMQ5. Know how to establish and develop mathematical models using appropriate informatics, scientific and technological basis for the design of new products, processes, systems and services, and for other already developed optimization.

CEMQ3. Conceptualize engineering models; apply innovative methods in problem solving and applications suitable for the design, simulation, optimization and control of processes and systems.

CEMQ2. Designing products, processes, systems and services for the chemical industry as well as the optimization of other already developed technology based on various areas of chemical engineering, understanding of processes and transport phenomena, separation operations and engineering chemical reactions, nuclear, electrochemical and biochemical.

CEMQ14. The student will be able to analyze the economic feasibility of a chemical engineering project.

Full-or-part-time: 15h

Theory classes: 6h

Practical classes: 2h

Self study : 7h

Managing uncertainty

Description:

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Full-or-part-time: 8h

Theory classes: 2h

Laboratory classes: 6h

GRADING SYSTEM

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EXAMINATION RULES.

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BIBLIOGRAPHY

Basic:

- Seider, Warren D. [et al.]. Product and process design principles : synthesis, analysis, and evaluation. 4th ed. Hoboken: John Wiley & Sons, cop. 2017. ISBN 9781119588009.
- Biegler, Lorenz T. Systematic methods of chemical process design. Upper Saddle River: Prentice Hall, 1997. ISBN 0134924223.
- Douglas, James M. Conceptual design of chemical processes. New York: McGraw-Hill, 1988. ISBN 0070177627.
- Edgar, Thomas F. Optimization of chemical processes. 2nd ed. Boston: McGraw-Hill, 2001. ISBN 0070393591.
- Smith, Robin. Chemical process design and integration. Chichester, UK: John Wiley & Sons, 2005. ISBN 0471486809.
- Peters, Max Stone. Plant design and economics for chemical engineers. 5th ed. New York: McGraw-Hill International Book, 2003. ISBN 9780071240444.

RESOURCES

Other resources:

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