



## Course guide

# 240EQ034 - 240EQ034 - Advanced Design in Chemical Processes

Last modified: 27/05/2024

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

**Degree:** **Academic year:** 2024 **ECTS Credits:** 4.5  
**Languages:** Catalan, Spanish, English

### LECTURER

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**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

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**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 :**

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

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.

**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 :**

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.

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.

**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 :**

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.

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.

**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

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### 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

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### Other resources:

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