# 295552 - 295EQ013 - Chemical and Catalytic Reaction Engineering

**Coordinating unit:** 295 - EEBE - Barcelona East School of Engineering  
**Teaching unit:** 713 - EQ - Department of Chemical Engineering  
**Academic year:** 2019  
**Degree:** MASTER'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2019). (Teaching unit Compulsory)  
**ECTS credits:** 6  
**Teaching languages:** English

## Teaching staff

**Coordinator:** JORDI LLORCA PIQUE  
**Others:**  
- Primer quadrimestre:  
  - JORGE BOU SERRA - T10  
  - AURELIO CALVET TARRAGONA - T10  
  - FRANCISCO ESTRANY CODA - T10  
  - JORDI LLORCA PIQUE - T10

## Opening hours

**Timetable:** To be determined by students and faculty  

## Prior skills

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## Requirements

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## Degree competences to which the subject contributes

### Specific:

- CEMUEQ-01. 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  
- CEMUEQ-02. To design products, processes, systems and services of the chemical industry, as well as the optimization of others already developed, taking as a technological base the various areas of chemical engineering, including processes and transport phenomena, separation operations and engineering of chemical, nuclear, electrochemical and biochemical reactions  
- CEMUEQ-05. To manage and supervise all types of facilities, processes, systems and services of the different industrial areas related to chemical engineering

### Generical:

- CGMUEQ-01. Ability to apply the scientific method and the principles of engineering and economics, to formulate and solve complex problems in processes, equipment, facilities and services, in which the matter undergoes changes in its composition, state or energy content, characteristic of the chemical industry and other related sectors among which are the pharmaceutical, biotechnological, materials, energy, food or environmental

### Transversal:

- 06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.  
- 03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
Learning objectives of the subject

To develop the technical criteria to define a system of reactors of an industrial process based on chemical, biological, catalysis, mass and heat transfer data, material and energy flows
To obtain the training to analyze scientifically and technologically any kind of chemical or biological reactor and express the bases for its optimization and/or modification
Identify the problems and shortcomings of reactor-based chemical facilities and be able to provide engineering solutions
To reach scientific spirit to investigate new developments in the field of reactors

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>42h</th>
<th>28.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>12h</td>
<td>8.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>96h</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
## Content

### Catalysis

**Learning time:** 38h  
Theory classes: 16h  
Self study: 22h

**Description:**  

**Related activities:**  
Design of heterogeneous catalysts

**Specific objectives:**  
To obtain the scientific basis of catalysis and the catalytic systems used at industrial level. Acquire the ability to evaluate the efficiency of catalysts and be able to design and use them successfully in industrial processes

### Multiphase reactors

**Learning time:** 38h  
Theory classes: 16h  
Self study: 22h

**Description:**  

**Related activities:**  
Reactor analysis

**Specific objectives:**  
To acquire the theoretical and practical concepts of reactors that work in different phases, extrapolating the bases of mass transfer to these units. To acquire the theoretical and practical concepts of the reactors that work with solid catalysts and be able to perform a design and dimensioning of these equipment
Enzymatic reactors and bioreactors

Learning time: 38h
  Theory classes: 16h
  Self study: 22h

Description:

Related activities:
Analysis of enzymatic production systems and fermentation

Specific objectives:
Acquire the theoretical and numerical concepts of enzymatic bioreactions and their applications. Acquire the theoretical and numerical concepts of fermentations and their applications

Qualification system
Continuous evaluation (3 exams, 25% each exam) and completion and presentation of a project (25%). Without reevaluation.

Regulations for carrying out activities
Written exams are individual. The project is carried out in groups of two people
Bibliography

Basic:


Complementary:


Others resources:

Notes from class and other documents from the Digital Campus