295562 - 295EQ132 - Advanced Catalytic Reactors

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2018
Degree: ECTS credits: 6

Teaching languages: English

Teaching staff

Coordinator: Llorca Pique, Jordi
Others: Perez Moya, Montserrat
Soler Turu, Lluis

Opening hours

Timetable: To be determined by students and faculty

Prior skills

- Requirements

Have passed the subject "Chemical and Catalytic Reaction Engineering" (Q1)

Teaching methodology

Classroom. Self-study. Learning from projects and study cases

Learning objectives of the subject

Knowledge of the different types of catalytic wall reactors and their operation
Knowledge of catalyst deposition techniques
Knowledge of the operation of structured reactors and microreactors
Ability to design a process with catalytic wall reactors
Knowledge of the fundamentals and operation of catalytic membrane reactors and their applications
Knowledge of the mechanism of photocatalytic reactions and operation of photocatalysts
Knowledge of the different types of photocatalytic reactors and their applications
Ability to design a photocatalytic process
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 28h 18.67%</th>
<th>Hours medium group: 0h 0.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group: 14h 9.33%</td>
<td>Guided activities: 6h 4.00%</td>
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<tr>
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<td>Self study: 102h 68.00%</td>
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### Structured reactors

**Description:**
Honeycomb catalytic reactors with ceramic and metallic substrates. Techniques of deposition of catalysts in structured reactors. Environmental applications. Microreactors: manufacturing, mass and heat transfer, advantages of "scale out" vs. "cale up". Applications in the chemical and pharmaceutical industry. Peripheral elements

**Related activities:**
Design of a structured reactor or microreactor

**Specific objectives:**
To learn the different types of catalytic wall reactors and how to coat them with a catalyst. To understand the operation of the catalytic converters of vehicles with combustion engines. To know the advantages of microreactor technology and its applications

**Learning time:** 28h 30m  
Theory classes: 7h 30m  
Self study: 21h

### Membrane catalytic reactors

**Description:**

**Related activities:**
Case study of a real application

**Specific objectives:**
To understand the operation of a membrane catalytic reactor and the importance of the operating conditions in its dynamics and behavior. To know the basic control tools of the catalytic membrane reactors and their main applications

**Learning time:** 24h  
Theory classes: 6h  
Self study: 18h
### Photocatalysis

**Learning time:** 24h  
Theory classes: 6h  
Self study: 18h

**Description:**  

**Related activities:**  
Search of documentation in patents and scientific literature

**Specific objectives:**  
To know the principles of photocatalysis and the characteristics of a photocatalyst. To understand the operation principles of photocatalysis and its application in different types of chemical processes

<table>
<thead>
<tr>
<th>Photoreactors</th>
<th>Learning time: 13h 30m</th>
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<tbody>
<tr>
<td>Theory classes: 10h 30m</td>
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<tr>
<td>Self study: 3h</td>
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**Description:**  
Advanced oxidation processes. Water treatment. Study of the operating parameters: photon transfer, temperature effect, mass transfer. Design of photoreactors

**Related activities:**  
Study case of a real application

**Specific objectives:**  
To know the principles of applied photocatalysis and photoreactors, with emphasis on water treatment. To understand the operating parameters of photoreactors and the optimization of photocatalytic processes

### Qualification system

50% written exam and 50% exercises

### Regulations for carrying out activities

Written exams and exercises are individual
Bibliography

Complementary:


Others resources:

Notes from class and other documents from the Digital Campus