### 295556 - 295EQ032 - Nanotechnology

<table>
<thead>
<tr>
<th>Coordinating unit:</th>
<th>295 - EEBE - Barcelona East School of Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching unit:</td>
<td>713 - EQ - Department of Chemical Engineering</td>
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<tr>
<td>Academic year:</td>
<td>2019</td>
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<tr>
<td>Degree:</td>
<td>MASTER'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2019). (Teaching unit Compulsory)</td>
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<tr>
<td>ECTS credits:</td>
<td>6</td>
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<tr>
<td>Teaching languages:</td>
<td>Catalan, Spanish, English</td>
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</table>

#### Teaching staff
- **Coordinator:** Carles Alemán
- **Others:** Joan Torras and Francesc Estrany

#### Opening hours
- **Timetable:** The first day of class will be defined.

#### Prior skills
Nanotechnology

#### Requirements
Basic knowledge of materials acquired during undergraduate studies. Having studied the subject "Biotechnological Processes and Polymer Industry"

#### Degree competences to which the subject contributes

**Specific:**
- 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-04. Ability to solve problems that are unfamiliar, ill-defined, and have opposed specifications, considering the possible solution methods, including the most innovative, selecting the most appropriate, and being able to correct the implementation, evaluating the different design solutions

**General:**
- CGMUEQ-10. Adapt to changes, being able to apply new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit

**Transversal:**
- 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.

#### Teaching methodology
- Classes and presentation of works.

#### Learning objectives of the subject
Learn basic knowledge related to the use of polymers and biopolymers in nanotechnology. Learn the concepts that relate
the structure and properties of nanostructured materials for their technological application and biotechnology

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

**Learning time:** 9h  
Theory classes: 9h

**Description:**  

**Related activities:**  
Development and presentation of specific works on topics selected by the teaching staff.

**Specific objectives:**  
Acquire basic knowledge and theoretical foundations about nanotechnology.

## Nanocomposites based on nanotubes, nanofibres, nanoparticles and nanosheets

**Learning time:** 11h  
Theory classes: 11h

**Description:**  

**Related activities:**  
Development and presentation of specific works on topics selected by the teaching staff.

**Specific objectives:**  
Acquire basic knowledge and theoretical foundations about nanocomposites based on nanotubes, nanofibres, nanoparticles and nanosheets.

## Polymeric nanomembranes

**Learning time:** 11h  
Theory classes: 11h

**Description:**  
The materials for the manufacture of ultra-fine membranes. Preparation of ultra-fine membranes. Giant nanomembranes The functionalization of ultra-fine membranes. Applications of ultra-fine membranes in Electronics and Biomedicine.

**Related activities:**  
Development and presentation of specific works on topics selected by the teaching staff.

**Specific objectives:**  
Acquire basic knowledge and theoretical foundations about polymeric nanomembranes.
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<table>
<thead>
<tr>
<th>Polymeric nanofibers</th>
<th>Learning time: 11h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 11h</td>
</tr>
<tr>
<td>Polymeric materials for the manufacture of nanofibres. Preparation of nanofibres. The functionalization of nanofibres.</td>
<td></td>
</tr>
<tr>
<td><strong>Related activities:</strong></td>
<td></td>
</tr>
<tr>
<td>Development and presentation of specific works on topics selected by the teaching staff.</td>
<td></td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
<tr>
<td>Acquire basic knowledge and theoretical foundations about polymeric nanofibers.</td>
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</tbody>
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**Qualification system**

\[ NC = \frac{(NP1+NP2+NP3+NP4+2 \cdot E)}{6} \]

where NC is the course mark, NP1-NP4 are the notes of the for parts in which the subject is divided and E is the mark of the exam.

**Regulations for carrying out activities**

Works and presentations drawn up by teams of two-three students depending on the number of students enrolled. The written exam will be held individually at the end of the semester. It has a minimum of 70% attendance at the classes, in order to be able to reflect the preparation of the different Works assigned to teams.

**Bibliography**

**Others resources:**

Supplied by the teaching staff.