820037 - BIB - Biomedical Implants

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
       BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6  Teaching languages: English

Coordinator staff

Coordinator: Daniel Rodríguez Rius
Others: Primer quadrimestre:
        DANIEL RODRÍGUEZ RÍUS - T11

Opening hours

Timetable: View information on Atenea.

Requirements

BIOMATERIALS - Prerequisite
BIOMECHANICA - Prerequisite

Degree competences to which the subject contributes

Specific:
1. Understand biomechanics and biomaterials.

Transversal:
2. 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.
3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

Teaching methodology

The course is divided up as follows:
- 30% face-to-face expository classes (theory)
- 15% face-to-face directed classes (problems and seminars)
- 55% self-directed learning (group project and study)

An important component of the course is based on the performance of a group project done through the course. It corresponds to an activity initially oriented by the teacher, but developing afterwards more autonomously, with mentoring support.

Learning objectives of the subject

After completing the course the student should be able to:
- Understand the principles and concepts of the application of biomedical implants and be able to use them in projects within biomedical engineering.
- Understand the fundamental criteria to be met by a biomedical implant for its use.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>45h</th>
<th>30.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time:</td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
<td>10.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
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## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
<th>Specific objectives</th>
</tr>
</thead>
</table>
| **Biomaterials. Types and properties.**           | 9h            | **Description:** Presentation of the characteristics of biomaterials: what is a biomaterial, how is it classified and what are their most important properties. | **Definition of biomaterial.**  
**Classification of biomaterials.**  
**Properties of biomaterials.** |
|                                                   |               | **Specific objectives:**  
Definition of biomaterial.  
Classification of biomaterials.  
Properties of biomaterials. | **Definition of biomaterial.**  
**Classification of biomaterials.**  
**Properties of biomaterials.** |
| **Biomedical implants. Types and properties.**    | 36h           | **Description:** Presentation of the characteristics of biomedical implants: how are them defined, classified and what are their most important properties. | **Definition of biomedical implants.**  
**Classification of biomedical implants.**  
**Properties of biomedical implants.** |
|                                                   |               | **Specific objectives:**  
Definition of biomedical implants.  
Classification of biomedical implants.  
Properties of biomedical implants. | **Definition of biomedical implants.**  
**Classification of biomedical implants.**  
**Properties of biomedical implants.** |
| **Biological response to biomedical implants.**   | 20h           | **Description:** Study of the biological response and biocompatibility of biomedical implants. | **Study of the biological response to an implant insertion in the human body.**  
**Study of the biocompatibility of the biomedical implants.** |
|                                                   |               | **Specific objectives:**  
Study of the biological response to an implant insertion in the human body.  
Study of the biocompatibility of the biomedical implants. | **Study of the biological response to an implant insertion in the human body.**  
**Study of the biocompatibility of the biomedical implants.** |
## Design of biomedical implants.

<table>
<thead>
<tr>
<th>Learning time: 56h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 14h</td>
</tr>
<tr>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td>Self study : 40h</td>
</tr>
</tbody>
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**Description:**
Methodologies and techniques used in the design and calculation of biomedical implants.

**Specific objectives:**
- To understand the main stages of the design flow of biomedical implants.
- To understand the methodologies used for the calculation of biomedical implants.

## Legal framework and standards for biomedical implants.

<table>
<thead>
<tr>
<th>Learning time: 19h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td>Self study : 10h</td>
</tr>
</tbody>
</table>

**Description:**
Regulations and legal framework that affects biomedical implants.

**Specific objectives:**
- Understand the legal issues affecting the design, manufacture and use of biomedical implants.

## New trends in the development of biomedical implants.

<table>
<thead>
<tr>
<th>Learning time: 9h 30m</th>
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<tbody>
<tr>
<td>Theory classes: 4h 30m</td>
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<tr>
<td>Self study : 5h</td>
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**Description:**
Presentation of the current lines of research in biomedical implants, objectives and future trends of design.

**Specific objectives:**
- To acquire a knowledge of the future trends of design of biomedical implants.

### Qualification system

Partial exams (2): 25%
Final exam: 35%
Problems and participation in seminars: 20%
Group project (Generic competence): 20%
This subject does not include a reevaluation test.
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Regulations for carrying out activities

The use of any electronic equipment with wireless communication capabilities is strictly forbidden in the evaluations.

Bibliography

Basic:


Complementary: