Degree competences to which the subject contributes

Transversal:
1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

Teaching methodology

This subject uses the expositive methodology (theory) in a 30%, self study and work as well as group work (guided activities) in a 22% in class, self study and work as well as group work (non presential) in a 45%.
The professor will provide the students with the necessary bibliography as well as scientific papers to be used to work at home and in class.

Learning objectives of the subject

The general objective is to treat the different issues that play a role in tissue engineering from a high interdisciplinar view. It is the aim that students can understand the need of controlling all factors related to biomaterials architecture, cell biology, biochemistry pathways, surface characterization and modification and the effect of different stimuli (physicals and chemicals), to be able to grow tissues through the discipline known as tissue engineering.
# Study load

<table>
<thead>
<tr>
<th>Total learning time:</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>150h</td>
<td>60h</td>
<td>0h</td>
<td>0h</td>
<td>90h</td>
</tr>
</tbody>
</table>

- Total learning time: 150h
- Hours large group: 60h (40.00%)
- Hours medium group: 0h (0.00%)
- Hours small group: 0h (0.00%)
- Self study: 90h (60.00%)
### (ENG) · Theme 1. Introduction.

**Description:**
What is tissue engineering?. Bases: Materials, cells and stimuli.

**Related activities:**
Activity 1. Strategies in tissue engineering.

**Specific objectives:**
To understand the globality of this discipline and the interrelations among the different features.

**Learning time:** 13h  
Theory classes: 6h  
Self study: 7h

### (ENG) · Theme 2. The cells.

**Description:**

**Related activities:**
Activity 2. Questions on stem cells.

**Specific objectives:**
To get knowledge in which cell types are available to be used in tissue engineering applications.

**Learning time:** 17h  
Theory classes: 7h  
Self study: 10h

### (ENG) · Theme 3. Nanotecnology applied to tissue engineering.

**Description:**
Conference about nanotecnology tools to be used in tissue engineering.

**Related activities:**
Activity 3. Questions about the conference.

**Learning time:** 6h  
Theory classes: 2h  
Self study: 4h
<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
<th>Specific objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Biochemical stimuli.</td>
<td>Growth factors and cytokines.</td>
<td>Get to know the type of factors and their effects.</td>
</tr>
<tr>
<td>6. Surfaces: Properties, modification and characterisation.</td>
<td>Properties, modification and characterisation.</td>
<td>Get to know the surface properties of biomaterials and the characterization methods. Get to know the type and methodologies of surface modifications to apply them to different applications.</td>
</tr>
</tbody>
</table>
### Theme 7. Regenerative medicine vs bionics. Materials and devices.

**Description:**
Materials and devices.

**Specific objectives:**
Get to know the different applications for tissue engineering and bionics.

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>11h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>5h</td>
</tr>
</tbody>
</table>

### Theme 8. Products: from the bench to the market. Conference.

**Description:**
Conference.

**Related activities:**
Activity 6. Debate.

**Specific objectives:**
To understand the difficulties to go from basic research to commercialization of biomedical devices.

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>14h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>4h</td>
</tr>
<tr>
<td>Self study:</td>
<td>10h</td>
</tr>
</tbody>
</table>

### Theme 9. Angiogenesis and vascularization.

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>4h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>2h</td>
</tr>
<tr>
<td>Self study:</td>
<td>2h</td>
</tr>
</tbody>
</table>

### Theme 10. Effect of mechanical stimuli. Mecanotransduction.

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>9h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>4h</td>
</tr>
<tr>
<td>Self study:</td>
<td>5h</td>
</tr>
</tbody>
</table>
(ENG) -- Theme 11. Applications in tissue engineering and regenerative medicine. Final course work to prepared by the students.

**Description:**
Final work of the course.

**Related activities:**
Activity 7. Students will prepare, in groups, a presentation getting together all what has been treated in the course and focus it in an specific application in tissue engineering.

**Specific objectives:**
Assolir la matèria donada durant el curs a partir de la búsqueda d'una aplicació concreta.

**Qualification system**

The evaluation will be by means of continuos evaluation.
Guided activities: 30%
Final presentation: 20%
Exam: 50% mid-term and final
Transversal competencies: EFFICIENT ORAL AND WRITTEN COMMUNICATION and EFFECTIVE USE OF INFORMATION RESOURCES: 5%
There will be re evaluation if the student has presented to the final exam.

**Bibliography**

**Basic:**

