240EM133 - Bioceramics

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy
Academic year: 2018
Degree: MASTER’S DEGREE IN MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ERASMUS MUNDUS MASTER’S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ERASMUS MUNDUS MASTER’S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Teaching unit Optional)
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MASTER’S DEGREE IN MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 4,5  Teaching languages: English

Coordinator: Ginebra Molins, Maria Pau

Degree competences to which the subject contributes

Specific:
CEMCEM-11. (ENG) Gestionar la investigació. Desenvolupament e Innovació Tecnològica, atenent a la tranferència de tecnologia i els drets de propietat i de patents
CEMCEM-04. (ENG) Realitzar estudis de caracterització, avaluació i certificació de materials segons les seves aplicacions

Transversal:
06 URI N3. 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.
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

- Participative lectures
- Invited lectures
- Lab practices
- Online questionnaires
- Cooperative learning: group work

Learning objectives of the subject

The goal of the course is to provide the scientific bases for the knowledge on ceramic materials used in medical applications. The different types of ceramic biomaterials are presented. Their structure, physical-chemical and mechanical properties, together with their interactions with the biological systems are analyzed.
### Study load

<table>
<thead>
<tr>
<th>Study type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time: 112h 30m</td>
<td>27h</td>
<td>24.00%</td>
</tr>
<tr>
<td>Hours large group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours medium group:</td>
<td>13h 30m</td>
<td>12.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>72h</td>
<td>64.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Content

| Introduction. | **Learning time:** 4h 30m  
Theory classes: 1h 30m  
Self study: 3h |
|---------------|--------------------------------------------------|
| **Description:**  
Ceramics as biomaterials. Historical perspective and current state. |

| Biominerals and mineralised tissues | **Learning time:** 22h 30m  
Theory classes: 7h 30m  
Self study: 15h |
|-----------------------------------|--------------------------------------------------|
| **Description:**  
Biological ceramics. Structure and properties of mineralised tissues. Bone, dentin and dental enamel |

| Biostable ceramics | **Learning time:** 20h  
Theory classes: 6h  
Guided activities: 2h  
Self study: 12h |
|--------------------|--------------------------------------------------|
| **Description:**  
Ceramic oxides: alumina and zircona. Structure, properties and applications in the biomedical field |

| Bioactive ceramics | **Learning time:** 38h  
Theory classes: 10h  
Laboratory classes: 8h  
Self study: 20h |
|--------------------|--------------------------------------------------|
| **Description:**  
Calcium phosphate-based ceramics. Bioactive glasses and glass ceramics. Processing, structure, properties and applications. |

| Aplicaciones de las biocerámicas | **Learning time:** 27h 30m  
Theory classes: 7h 30m  
Guided activities: 20h |
|----------------------------------|--------------------------------------------------|
| **Description:**  
content english |
Qualification system

\[ N_{\text{final}} = 0.60 \, N_{\text{ef}} + 0.10 \, N_{\text{ep}} + 0.10 \, N_{\text{pl}} + 0.2 \, N_{\text{sem}} \]

\( N_{\text{final}} \): nota final
\( N_{\text{ef}} \): nota examen final
\( N_{\text{ep}} \): nota examen parcial
\( N_{\text{pl}} \): nota prácticas de laboratorio
\( N_{\text{sem}} \): nota seminarios

Bibliography

Basic:


Others resources:

Audiovisual material

Nom recurs

Resource