Course guides
295755 - 295EM033 - Advanced Ceramics

Unit in charge: Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering.

Degree: MASTER'S DEGREE IN MATERIALS SCIENCE AND ADVANCED MATERIALS ENGINEERING (Syllabus 2019). (Compulsory subject).

Academic year: 2021  ECTS Credits: 6.0  Languages: Spanish

LECTURER

Coordinating lecturer: Emilio Jiménez
Others: Maria Pau Ginebra

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

1.- Understand the microstructure and properties of advanced ceramics
2.- Design optimal sintering and processing strategies to optimize properties
3.- Select the best advanced ceramics for different applications
4.- Understand the design requirements and the biological response to ceramics and glass for biomedical applications

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>96,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>42,0</td>
<td>28.00</td>
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</tbody>
</table>

Total learning time: 150 h

CONTENTS

TOPIC 1 CERAMIC STRUCTURES AND MECHANICAL PROPERTIES

Description:

Full-or-part-time: 12h 30m
Theory classes: 3h
Laboratory classes: 1h
Self study : 8h 30m
### TOPIC 2. SINTERING

**Description:**
Manufacturing: Dry routes. Wet routes. Colloids. Sintering, including FAST techniques. Monocrystals. 3D printing

**Full-or-part-time:** 25h  
Theory classes: 6h  
Laboratory classes: 2h  
Self study : 17h

### TOPIC 3. CERAMIC TYPES

**Description:**

**Full-or-part-time:** 25h  
Theory classes: 6h  
Laboratory classes: 2h  
Self study : 17h

### TOPIC 4. CERAMICS FOR STRUCTURAL PROSTHESIS

**Description:**
Dental ceramics. Dental implants. Ceramics for Joints. Reliability and mechanical considerations

**Full-or-part-time:** 25h  
Theory classes: 6h  
Laboratory classes: 2h  
Guided activities: 17h

### TOPIC 5. BIOLOGICAL CERAMICS: BIOMINERALS

**Description:**
Biomineralization. Structural characteristics and properties of biological ceramics. Bioceramics in biological tissues.

**Full-or-part-time:** 20h  
Theory classes: 3h  
Self study : 17h

### TOPIC 6. BIOCERAMICS

**Description:**
Bioactive ceramics and resorbable ceramics. Glass and glass ceramic for biomedical applications. Biological characterization of bioceramics

**Full-or-part-time:** 63h 30m  
Theory classes: 15h  
Laboratory classes: 6h  
Self study : 42h 30m
GRADING SYSTEM

BIBLIOGRAPHY

Basic:

Complementary: