Course guide  
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).  
ERASMUS MUNDUS MASTER’S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2021). (Optional subject).

Academic year: 2022  
ECTS Credits: 6.0  
Languages: Spanish

LECTURER

Coordinating lecturer: Emilio Jiménez

Others: Primer quadrimestre:
LAURA DEL MAZO BARBARÀ - Grup: T10
MONTSERRAT ESPAÑOL PONS - Grup: T10
MARIA PAU GINEBRA MOLINS - Grup: T10
EMILIO JIMENEZ PIQUÉ - Grup: T10
MIGUEL MORALES COMAS - Grup: T10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMCEAM-01. (ENG) Dissenyar i desenvolupar productes, processos i sistemes, això com l'optimització d’altres ja desenvolupats, atenent a la selecció de materials per aplicacions específiques.
CEMCEAM-02. (ENG) Aplicar métodos innovadores para el diseño, simulación, optimización y control de procesos de producción y transformación de materiales
CEMCEAM-05. (ENG) Interpretar y aplicar normativas y especificaciones relativas a los materiales y sus aplicaciones

Transversal:
06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

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>
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<tr>
<td>Hours small group</td>
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<td>4.00</td>
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<tr>
<td>Self study</td>
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<td>64.00</td>
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<tr>
<td>Type</td>
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<tr>
<td>Hours large group</td>
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<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: