

Course guide

240EM114 - 240EM114 - Structure, Processing and Properties of Ceramic Materials

Last modified: 02/06/2022

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 ENGINEERING (Syllabus 2014). (Optional subject).
Academic year: 2022 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Roa Rovira, Joan Josep

Others: Roa Rovira, Joan Josep

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEMCEM-02. (ENG) Dissenyar i desenvolupar productes, processos, sistemes i serveis, així com l'optimització d'altres ja desenvolupats, atenent a la selecció de materials per a aplicacions específiques

Transversal:

06 URI N2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

TEACHING METHODOLOGY

Subject in process of extinction. There is no teaching, the students that enroll it do so only with the right to an exam.

LEARNING OBJECTIVES OF THE SUBJECT

El objetivo de la asignatura es que el estudiante adquiera conocimientos básicos sobre estructura, propiedades, fabricación, diseño y comportamiento en servicio de materiales cerámicos, tanto cerámicos tradicionales como materiales cerámicos avanzados.

Al final el curso el estudiante debe ser capaz de:

- Identificar las principales estructuras cristalográficas y microestructuras cerámicas
- Seleccionar los métodos óptimos de fabricación para componentes cerámicos
- Diseñar para optimizar la integridad estructural y fiabilidad de los componentes cerámicos

STUDY LOAD

Type	Hours	Percentage
Hours small group	9,0	12.00
Hours large group	18,0	24.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Introduction to ceramic materials

Description:

Classification of ceramic materials. Binary and ternary crystalline structures. Silicates and aluminosilicates. Glasses.

Specific objectives:

Classification of ceramic materials. Binary and ternary crystalline structures. Silicates and aluminosilicates. Glasses.

Related activities:

Supervised activities

Full-or-part-time: 12h

Theory classes: 3h

Guided activities: 1h

Self study : 8h

Microstructure and phase equilibrium

Description:

Binary ceramic phase diagrams. Ternary ceramic phase diagrams. Non-equilibrium phase diagrams. TTT curves and glass formation. Ceramic microstructures.

Specific objectives:

Binary ceramic phase diagrams. Ternary ceramic phase diagrams. Non-equilibrium phase diagrams. TTT curves and glass formation. Ceramic microstructures.

Related activities:

Supervised activities

Full-or-part-time: 14h

Theory classes: 5h

Guided activities: 2h

Self study : 7h

Fabrication Technology

Description:

Introduction to processing. Raw Materials. Solid state sintering. Forming methods. Additives. Glass.

Specific objectives:

Introduction to processing. Raw Materials. Solid state sintering. Forming methods. Additives. Glass.

Related activities:

Supervised activities and laboratory

Full-or-part-time: 23h

Theory classes: 7h

Laboratory classes: 2h

Guided activities: 2h

Self study : 12h



Design, mechanical properties and reliability

Description:

Design concerns. Mechanical properties. Fragility and reliability of Ceramics

Specific objectives:

Design concerns. Mechanical properties. Fragility and reliability of Ceramics

Related activities:

Supervised activities and laboratory

Full-or-part-time: 14h

Theory classes: 4h

Laboratory classes: 2h

Guided activities: 2h

Self study : 6h

Thermal and thermomechanic behaviour

Description:

Thermal properties. Thermomechanic: Thermal shock and creep

Specific objectives:

Thermal properties. Thermomechanic: Thermal shock and creep

Full-or-part-time: 12h

Theory classes: 4h

Guided activities: 2h

Self study : 6h

GRADING SYSTEM

Subject in process of extinction. There is only one final test that corresponds to 100% of the final grade of the subject.

BIBLIOGRAPHY

Basic:

- Carter, C. Barry ; Norton, M. Grant. Ceramic materials : science and engineering. 2nd ed. New York: Springer, 2013. ISBN 9781461435228.

RESOURCES

Audiovisual material:

- Resource name. Notes in Atenea