

## 26805 - Chemistry and Optical Materials

### Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	297 - Degree in Optics and Optometry
ECTS	9.0
Course	1
Period	Annual
Subject Type	Basic Education
Module	---

### 1. Basic info

#### 1.1. Recommendations to take this course

#### 1.2. Activities and key dates for the course

### 2. Initiation

#### 2.1. Learning outcomes that define the subject

#### 2.2. Introduction

### 3. Context and competences

#### 3.1. Goals

#### 3.2. Context and meaning of the subject in the degree

#### 3.3. Competences

#### 3.4. Importance of learning outcomes

### 4. Evaluation

### 5. Activities and resources

#### 5.1. General methodological presentation

The process of learning design for this matter is based on the following

The main goal of this subject is to explain basic concepts, models and theories of chemistry (in special inorganic and organic chemistry) including their relation with the optical properties of the materials, which will allow to the student to

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apply structural knowledge in order to understand the physical and chemical properties of optical materials (frames, ophthalmic lens and contact lens). For this reason the main methodology is based on lectures and tutorial sessions.

On the other hand, a methodology based on problems resolution will be used for strengthening the learning process. Besides, laboratory practice sessions will be programmed to apply the theoretical knowledge and get laboratory skills.

### 5.2.Learning activities

Training activity 1: Acquisition of chemistry and optical materials basic knowledge (5 ECTS)

Methodology: Plenary lectures. Self-learning: view videos and web pages about matter.

Training activity 2: Classroom sessions for resolution of problems and case analysis (2 ECTS)

Methodology: Learning based on resolution of problems and questions. Teaching performed in small groups promoting the interactive discussion with the students and between them.

Training activity 4: Acquisition of practical knowledge, skills and abilities in chemistry and material chemistry.

Methodology: Laboratory practice sessions. Teamwork: Preparation of reports of experimental work. Individual work: resolution of a questionnaire at the end of each practice session.

### 5.3.Program

The program of the matter is as follow:

#### **BLOCK I: Chemistry basic concepts. Materials study introduction**

1. Atomic structure. Periodic table y periodic properties.
2. Chemical bonds.
3. Solids and intermolecular forces. Relationship between composition-bond-structure and properties.
4. Inorganic oxides.

#### **BLOCK II. Optics materials: basic concepts. Inorganic optical materials.**

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5. Optical materials, basic concepts.
6. Lens materials. Inorganic glass: nature, fabrication and properties.

### **BLOCK III. Organic optical materials.**

7. Introduction to organic chemistry.
8. Introduction to polymer materials.
9. Fabrication of polymer materials.
10. Properties of organic materials.
11. Applications of polymers as optical materials: frames and ophthalmic lens.
12. Applications of polymers as optical materials: contact lenses.

### **5.4.Planning and scheduling**

#### **Calendar for classroom sessions and date of delivery of written works**

##### **Calendar for classes:**

The lectures and the seminar sessions (70 hours) will be taught along the entire academic course in one hour sessions. The specific schedule of these classes, established by the Faculty Board, will be provided to the students at the beginning of the academic year.

The specific schedule of the practical classes will be established by the coordinator of the degree. The schedule of the laboratory sessions will be announced well in advance. The laboratory classes will consist in 3-4 hours sessions.

##### **Date of delivery of written works:**

Throughout the course individual or group works will be proposed to the students. The dates of delivery of these works will be communicated well in advance.

### **5.5.Bibliography and recommended resources**

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- BB** Atkins, Peter William. Principios de química : los caminos del descubrimiento / Peter Atkins, Loretta Jones . - 3ª ed. Buenos Aires : Editorial médica panamericana, cop. 2006
- BB** Callister, William D., jr.. Introducción a la ciencia e ingeniería de los materiales / William D. Callister, jr ; [versión española por Pere Molera Solà y Marc J. Anglada Gomila] . - [1ª] ed. en español, reimp. Barcelona [etc.] : Reverté, 2007
- BB** Fernández Navarro, José María. El vidrio : [constitución, fabricación, propiedades] / José María Fernández Navarro . - 3ª ed. Madrid : Consejo Superior de Investigaciones Científicas : Sociedad Española de Cerámica y Vidrio, 2003
- BB** López Alemany, Antonio. Lentes de contacto : teoría y práctica / Antonio López Alemany [ ... et al.] . Xà tiva : Ulleye, 2008
- BB** Navarro Sentanyes, Antonio. Materiales ópticos inorgánicos / A. Navarro S.. - 5ª ed. Barcelona : [A. Navarro Sentanyes], 2006
- BB** Navarro Sentanyes, Antonio. Materiales ópticos orgánicos / Antonio Navarro Sentanyes, Manuel Blanco Fernández, Gloria Rico Arnaiz de las Revillas [Barcelona : Los autores], D.L. 1989
- BB** Química : la ciencia central / Theodore L. Brown ... [et al.] ; con la colaboración de Patrick Woodward ; traducción, Laura Fernández Enríquez ; revisión técnica, María Aurora Lanto Arriola . 11ª ed. México : Pearson Educación, 2009
- BB** Química general : principios y aplicaciones modernas / Ralph H. Petrucci ... [et al.] ; traducción, Concepción Pando García-Pumarino, Nerea Iza Cabo ; revisión técnica, Juan A. Rodríguez Renuncio . 10ª ed. Madrid [etc.] : Prentice Hall : Person educación, 2011

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**BB** Shackelford, James F.. Introducción a la ciencia de materiales para ingenieros / James F. Shackelford ; traducción, adaptación y revisión técnica, Alfredo Güemes, Nuria Martín . - 6ª ed., reimp. Madrid [etc.] : Pearson Prentice Hall, 2008

**BB** Tecnología óptica : lentes oftálmicas, diseño y adaptación / Jesús Caum Aregay ... [et al.] . - 1ª ed. Politecnos Barcelona : Edicions UPC, 2001

**BC** Contact lens practice / edited by Nathan Efron . - 1st publ., repr. Edinburgh [etc.] : Butterworth-Heinemann, 2007