

26805 - Chemistry and Optical Materials

Syllabus Information

Academic year: 2023/24

Subject: 26805 - Chemistry and Optical Materials

Faculty / School: 100 - Facultad de Ciencias

Degree: 297 - Degree in Optics and Optometry

ECTS: 9.0

Year: 1

Semester: Annual

Subject type: Basic Education

Module:

1. General information

The objective of this subject is to understand the different types of optical materials and their chemical, physical and optical properties. To this end, we will study the fundamental concepts, models and theories of chemistry that allow us to understand the relationship between chemical structure and composition with chemical and physical properties, especially optical ones.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement: Goal 12: Responsible Production and Consumption

It is recommended to have taken Physics and Chemistry in the 1st year of Baccalaureate and Chemistry in the 2nd year.

2. Learning results

- Description of matter and its transformations.
- Relationship between the structure of matter and its chemical and physical properties.
- Chemical problem solving.
- Differentiate optical materials according to different criteria
- Proper and safe handling of laboratory instruments.

3. Syllabus

BLOCK I. Basic concepts of chemistry. Introduction to the study of materials

1. Atomic structure. Periodic table and periodic properties.
2. Chemical bonds.
3. Solids and intermolecular forces. Composition-bonding-structure and properties relationship.

BLOCK II. Optical materials: basic concepts. Inorganic optical materials.

4. Vitreous materials. Inorganic glasses: nature, manufacture and properties. Inorganic oxides.
5. Optical materials, basic concepts.

BLOCK III. Organic optical materials.

6. Introduction to organic chemistry.
7. Introduction to polymer materials.
8. Manufacture of polymer materials.
9. Properties of polymeric materials.
10. Polymers as optical materials: ophthalmic frames and lenses.
11. Polymers as optical materials: contact lenses.

4. Academic activities

Participative master classes in full group (50 hours). Explanation of contents by the teacher with questions and issues raised by the students. Video viewing.

Problem solving and case analysis in small groups (20 hours). Learning based on the discussion of the resolution of problems and questions in small groups.

Laboratory practices in small groups (20 hours). Acquisition of practical knowledge, skills and abilities in chemistry and materials through teamwork, discussion of the results obtained in practice and individual resolution of questionnaires.

Autonomous work (student, 125 hours)

Tutorials

Evaluation tests (10 hours)

5. Assessment system

The contents of the subject are divided between the first term (Part I = Blocks I and II), the second term (Block III) and the practices.

Continuous Assessment

The grade for each term (Q) will be obtained according to the formula that most favours each student among the following ones

$$Q = [N*10 + PI1*10 + PI2*10 + R*5 + PTP*65]/100$$

$$Q = [N*10 + PTP*90]/100$$

where,

N is the grade of an inorganic or organic nomenclature test in the first and second quarter, respectively

PI1 and PI2 are two different midterm tests for each quarter

R is the resolution of exercises or tasks

PTP is a theoretical-practical test consisting of exercises and short theory questions related to all the contents of that four-month period. The PTPs will be carried out during the periods authorized by the Faculty for continuous evaluation tests.

To pass the subject it is necessary:

- obtaining five or more out of ten in the grade resulting from the arithmetic average of the grades of the two four-month periods, provided that the grades in the two PTPs are equal to or higher than 4.

-to have passed the practices of the subject, for which the attendance, the attitude, the quality of the student's experimental work and the answers to the previous and final questions will be valued.

Students who obtain a five out of ten in any of the grades of the first or second quarter and who have not passed the subject will keep this grade for the global evaluation mode.

Global Evaluation

On the dates set by the Faculty for the Global Evaluation, students may take the exams to improve their grades or to pass the part or parts of the subject that they have not passed during the term which are: Part I (blocks I and II), Part II (block III) and laboratory practices.

The laboratory practice test will consist of two parts: 1) short questions about the procedures of the practices and 2) the realization of a practice in the laboratory.

The tests of Part I and Part II will be analogous to the PTPs of the continuous assessment and will consist of written exams with problems and short theory questions.

To pass the subject, students must obtain at least a five out of ten in the part corresponding to blocks I and II and at least five out of ten in the part corresponding to block III and a "pass" in the lab practices. The final grade of the subject will be obtained as the arithmetic mean of the grades of Part I (Block I and Block II) and Part II (Block III).

If any of the parts (practices, part I or part II) is passed, it is no longer necessary to retake that part during the same academic year

The detailed definition of the assessment system will be explained in the presentation of the subject.