Universidad Zaragoza

Academic Year/course: 2022/23

26832 - Materials for the Optical and Ophthalmic Industry

Syllabus Information

Academic Year: 2022/23
Subject: 26832 - Materials for the Optical and Ophthalmic Industry
Faculty / School: 100 - Facultad de Ciencias
Degree: 297 - Degree in Optics and Optometry
ECTS: 6.0
Year:
Semester: First semester
Subject Type: Optional
Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented to the achievement of the learning objectives. It will help the students to acquire an advance knowledge about the structure and properties of optical and ophthalmic materials through the following teaching and learning tasks: theory sessions, laboratory sessions, academic works or assignments, seminars and classes and, if possible, a guided visit to industry.

During the course, an interactive approach to favour the discussion and to facilitate the comprehension of the main points of the subject will be taken. Consequently, students are expected to actively participate in the class throughout the semester.

Teaching materials will be available via Moodle. Additional information regarding the course will be provided at the beginning of the course.

4.2. Learning tasks

The course includes 6 ECTS organized according to:

- Theory sessions (3 ECTS): 30 hours
- Classes and seminars (1.2 ECTS): 12 hours
- Laboratory sessions (1 ECTS): 10 hours
- Academic work, assignment (0.8 ECTS): 8 hours

Theory sessions

The lectures (30 h) are designed to provide the students with advanced knowledge about materials used in the optical and ophthalmological industry. The main objectives of each lesson will be highlighted and an interactive environment will be used to discuss and reinforce the lecture contents

Classes and seminars

This activity (12 h) is dedicated to augmentation of the contents presented in lectures, as well as, problem-solving sessions.

If possible an applied seminar that includes a visit to industry will be programmed. A very active participation of the students in the sessions will be promoted.

Laboratory sessions

This activity (10h) requires the student to self-study the protocols and instructions for planned experiments before going to the lab. After undertaking the experiments in the chemical lab, the students are also required to elaborate reports that should include the answer to questions about theoretical-practical issues worked during each lab session.

Academic work, assignment

This activity (8 h) requires the student to undertake bibliographic search on a topic that extends the lecture material to elaborate a written report and make a presentation (oral exposition/poster). The tutor will give the student regular feedback on progress. In addition, the project requires the student to construct logical arguments to communicate effectively.

4.3. Syllabus

Theory sessions:

Lesson 1. Materials in the optical and ophthalmic industry: overview.

Lesson 2. Mineral and organic materials in lens design.

General properties. Optical mineral materials. Optical organic materials: evolution, types of organic materials in lens design and their properties.

Lesson 3. Contact lenses and intraocular lenses.

Contact lenses: Historical evolution, essential aspects in the use and comfort of contact lenses, rigid contact lenses, conventional hydrogel contact lenses, silicone hydrogel contact lenses.

Intraocular lenses: Rigid intraocular lenses, foldable intraocular lenses (silicone intraocular lenses, acrylic hydrophobic intraocular lenses, acrylic hydrogel intraocular lenses).

Lesson 4. Surface treatments and coatings for ophthalmic and contact lenses.

Treatments for ophthalmic lenses: Coloring, UV and / or HEV blocking, photochromic lenses, polarized lenses, hard coatings, anti-reflective coatings, anti-fog, smudge, and dust coatings.

Treatments for contact lenses: UV blocking, coloring (handling tints, cosmetic lenses).

Lesson 5. Organic materials in spectacle frame design.

General properties. Thermoplastic materials. Thermoset and thermo-elastic materials. Composite materials.

Lesson 6. Metallic materials in spectacle frame design.

General properties. Conventional alloys. Shape memory and super-elastic materials. Anticorrosion treatments and coatings.

Lesson 7. Industrial manufacturing technologies.

Mass production. Machining, shaping, and polishing. Lathe cutting, spin casting and cast molding.

Lesson 8. Organic materials for new ophthalmic treatments.

Materials for ocular wound repair and treatment. Materials for the development of ophthalmic drugs delivery and release systems.

4.4. Course planning and calendar

For students enrolled in the subject, place and schedule of lectures and examinations will be available on the website https://ciencias.unizar.es/, and in the page for the course on the platform Moodle at the University of Zaragoza https://moodle2.unizar.es/add/

Submission of projects and Moodle questionnaires will be held according to the schedule that will be announced in advance in the page for the course at Moodle. In addition, course materials and readings will be also available on the website for the course.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26832