Course guide
370042 - TRACTSUP - Surface Treatments in Contact and Ophthalmic Lenses

Last modified: 12/06/2025

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** Spanish, English

LECTURER

Coordinating lecturer: Ivan Ivanov

Others: Ivan Ivanov

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
CT5. Efficient use of informacion resources. To manage data and technical and scientific information adquisition, organization, analysis and visualization and to provide a critical appraisal of the results of this management
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.

Basic:
CB1-OPT. (ENG) Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio
CB3-OPT. (ENG) Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética

TEACHING METHODOLOGY

Expository and exercise classes in medium groups. Laboratory practice classes in small groups.
MD1 - Participatory lecture class of theoretical and practical content.
MD3 - Practical problem-solving class, with the participation of students, of practical cases and/or exercises related to the contents of the subject.
MD4 - Laboratory practices.
MD6 - Realization of problems, exercises, assignments and resolution of doubts through the Atenea virtual campus.

LEARNING OBJECTIVES OF THE SUBJECT

· Learn the surface treatments of materials, especially for contact lenses but also for ophthalmic lenses and frames.
· Learn the requirements for biomaterials for contact lenses and how they can be improved through surface treatments, in particular improvement of wetting and biocompatibility, and prevention of the formation of deposits.
· Learn the applications of coatings in ophthalmic lenses and frames and the optical and health requirements for the used materials.
· Learn how surface treatments for contact lenses, and coatings for ophthalmic lenses and frames are carried out.

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours medium group	22,5	30.00
Hours small group	7,5	10.00

Total learning time: 75 h

CONTENTS

Introduction

Description:
Introduction

Specific objectives:
Introduction and presentation of the subject

Related activities:
Presentation and explanation of practices

Full-or-part-time: 3h 30m
Practical classes: 1h
Laboratory classes: 1h 30m
Self study : 1h

Topic 1: Surfaces and interfaces

Description:
Surfaces and interfaces. Surface properties: surface tension, cohesion, adhesion.
Extension, wetting and contact angle. Adsorption: types and mechanisms of adsorption.

Related activities:
Practices, exercises and deliverables.

Full-or-part-time: 19h
Practical classes: 6h
Laboratory classes: 2h
Self study : 11h

Topic 2: The surface of biomaterials and treatments

Description:
The surface of biomaterials for contact lenses: Characteristics.
Humectability and its improvement. Moisturizing solutions. Surface treatments on contact lens materials.
Types and formation of films and biofilms: bioadhesive films and antibacterial films. Adsorption and deposits in contact lenses.
Contact lens cleaning.

Related activities:
Practices, exercises and deliverables

Full-or-part-time: 22h
Practical classes: 7h
Laboratory classes: 2h
Self study : 13h

Topic 3: Optical coatings

Description:
Optical coatings for mineral and organic lenses: anti-reflective, semi-reflective, eye protection and interference filters. Hardening treatments, easy to clean, anti-smudge.
Materials used and their properties. Techniques for obtaining coatings. Adhesion of coatings.

Related activities:
Practices, exercises and deliverables

Full-or-part-time: 16h
Practical classes: 4h
Laboratory classes: 2h
Self study : 10h

Topic 4: Deterioration and treatments in mounts

Description:
Surface deterioration of frames for ophthalmic lenses.
Types of coatings for metal frames: hypoallergenic coatings. Techniques for obtaining coatings.
Types of coatings for plastic frames: lacquered. Techniques for obtaining coatings.

Related activities:
Exercises and deliverables

Full-or-part-time: 6h
Practical classes: 2h
Self study : 4h

title english

Description:
content english

Full-or-part-time: 8h 30m
Practical classes: 2h 30m
Self study : 6h

ACTIVITIES

Seminars 1-4

Description:
Exercises of subjects 1-4 in 4 sessions of 60 minutes

Full-or-part-time: 4h
Practical classes: 4h

Pràctiques de laboratori

Full-or-part-time: 7h 30m
Laboratory classes: 7h 30m

GRADING SYSTEM

NF=0.50*Npf+0.20*Nex+0.20*NL+0.10*Npp
NF: Final grade, Npf: Final exam grade, Nex: Exercise handover grade, NL: Laboratory grade, Npp: Partial test grade
Reassessment: NF=0.80*Npf+0.20*NL

EXAMINATION RULES.

In the submission of exercises, a minimum of 70% of the proposed exercises is required. In the laboratory practices, a minimum of 80% of the scheduled laboratory practices must have been completed. Exam tests include quiz questions, short questions and exercises.

BIBLIOGRAPHY

Basic:
- Torrent Burgués, J. Química de superficies y tratamientos superficiales en materiales ópticos. Terrassa: L'autor, 2003. ISBN 8460785467.

Complementary:
- Barnes, G.T.; Gentle, I. Interfacial science: an introduction. 2nd ed. Oxford: Oxford University Press, 2011. ISBN 9780199571185.
- Smith, W.F.; Hashemi, J.; Murrieta, J.E. Fundamentos de la ciencia e ingenieria de los materiales. 7ª ed. Ciudad de México: McGraw-Hill, 2023. ISBN 9781456294878.
- Albella, José M. Láminas delgadas y recubrimientos: preparación, propiedades y aplicaciones. Madrid: Consejo Superior de Investigaciones Científicas, 2003. ISBN 8400081668.