Course guide
370048 - INTRAOCULA - Intraocular Lenses: Optics & Optometry Assessment

Last modified: 04/07/2025

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 731 - OO - Department of Optics and Optometry.

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

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

LECTURER

Coordinating lecturer: Vega Lerin, Fidel
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DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.
CT7. Foreign language. Demonstrate knowledge of a foreign language, preferably English, at an oral and written level that is consistent with graduates' future needs.

CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.
CT3. Teamwork. To be able to work as a member of a multidisciplinary team, either as a base member or undertaking managerial decisions aiming at developing projects from a practical and responsible standpoint, adopting commitments given the available resources
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

Basic:
CB2-OPT. (ENG) Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y osean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área 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
CB4-OPT. (ENG) Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado

TEACHING METHODOLOGY

Theoretical lectures
MD1 – Master class of theoretical and practical contents with the active participation of students.
MD3 – hand-on class related to the contents of the subject, with the participation of the students working on practical cases and/or exercises resolution
MD5 - Reading of didactic material, texts and articles related to the contents of the subject
MD6 - Solving problems, exercises, works and resolution of doubts through the Atenea virtual campus
MD7- Tutorials
Experimental & hand-on work
MD3 - hand-on class related to the contents of the subject, with the participation of the students working on practical cases and/or exercises resolution
MD4 - Laboratory practices
MD5 - Reading of didactic material, texts and related articles

LEARNING OBJECTIVES OF THE SUBJECT

The subject is based on geometric optics, wave optics and visual optics to understand the design and functionality of intraocular lenses. In addition, the calculation of the intraocular lens, the specific instrumentation, and pre and post-operative optometric aspects are also learning objectives.

STUDY LOAD

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

Total learning time: 75 h

CONTENTS

1. Optical Design and Classification of Intraocular Lenses (IOLs)

Description:
1.1 Phakic and pseudophakic IOLs.
1.2 Monofocal IOLs. Compensation of the corneal spherical aberration: Aspheric IOLs.
1.3 Monofocal IOLs. Compensation of the corneal astigmatism: Toric IOLs.
1.4 Multifocal IOLs. Advantages and disadvantages compared to monofocal designs.
1.5 Extended range of vision (ERV) IOLs. Advantages and disadvantages compared to monofocal & multifocal designs

Related activities:
Reading and critical analysis of scientific literature related to the subject.

Full-or-part-time: 13h 45m
Practical classes: 5h 30m
Self study : 8h 15m

2. Optical quality of IOLs

Description:
2.1 In-vitro evaluation with different eye models.
2.2 Through-focus quality assessment. Preclinical objective metrics.

Related activities:
Reading and critical analysis of scientific literature related to the subject.
Laboratory session 1: In-vitro evaluation of IOLs.

Full-or-part-time: 12h 30m
Practical classes: 3h
Laboratory classes: 2h
Self study : 7h 30m

3. Intraocular lens power calculation

Description:
3.1. Calculation formulas. Biometric measurements (axial length, keratometry,).
3.2. Sources of error in the IOL calculation and its influence on postoperative refractive error.
3.3. Special eyes.

Related activities:
Reading and critical analysis of scientific literature related to the subject.
Laboratory session 2: IOL calculators.

Full-or-part-time: 20h
Practical classes: 5h
Laboratory classes: 3h
Self study : 12h

4. Preoperative visual quality. Optometric assessment.

Description:
4.1. Biometry, topography and corneal aberrometry. Influence on the precision of the IOL calculation and on the selection of the IOL.
4.2. Additional tests: OCT, biomicroscopy, specular microscopy.

Full-or-part-time: 12h 30m
Practical classes: 5h
Self study : 7h 30m

5. Postoperative visual quality. Optometric assessment.

Description:
5.1 Defocus curve. Contrast Sensitivity.
5.2. Associated phenomena with patient dissatisfaction: residual refractive error, halos, glare, stereopsis.

Related activities:
Students' presentations (oral or poster)

Full-or-part-time: 16h 15m
Practical classes: 4h
Laboratory classes: 2h 30m
Self study : 9h 45m

ACTIVITIES

name english

GRADING SYSTEM

A=Laboratory sessions: 25%.
B=Group presentation: 30%.
C= Exam: 45%.
Subject Mark: 0,25xA+0,30xB+0,45xC
Transversal skills will be evaluated through the previous items
REASSESSMENT: The reassessment will consist of a single exam that may include questions related to theory and/or problems to solve and/or questions about laboratory sessions.

EXAMINATION RULES.

In case of partial or total copy of any evaluations of the course, will apply the provisions of General Academic Regulations UPC: Irregular actions potentially leading to a significant variation of the marks obtained by one or more students will be considered a breach of the assessment regulations. Such behaviour will result in a descriptive mark of "Fail" and a numerical mark of 0 for the examination in question and the subject, without prejudice to any disciplinary proceedings that may result from that behaviour.
If a student disagrees with this decision, he or she may file a complaint with the dean or director of the school. If the student is not satisfied with the response, he or she may lodge an appeal with the rector.
If copying (either partial or total) is found to have taken place on any course assessment, that which is stipulated in the Academic Regulations for Bachelor's and Master's Degrees at the UPC will apply. Any kind of cheating on any exam will, at the least, result in a mark of 0 for that exam, and possibly in more severe disciplinary action.

"Irregular actions potentially leading to a significant variation of the marks obtained by one or more students will be considered a breach of the assessment regulations. Such behaviour will result in a descriptive mark of "Fail" and a numerical mark of 0 for the examination in question and for the subject, without prejudice to any disciplinary proceedings that may result from that behaviour.

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The director or dean of the school makes decisions regarding allegations about any aspects not covered in the regulations."

BIBLIOGRAPHY

Basic:
- Alfonso Sánchez, José F. Lentes intraoculares bifocales, multifocales y acomodativas en cirugía del cristalino. [Madrid]: SECOIR, cop. 2007. ISBN 9788493314453.
- Pascual Segarra, Javier. Cálculo del poder dióptrico en lentes intraoculares: revisión actualizada. Barcelona: Edika Med, DL 1998. ISBN 8478772286.

Complementary:
- Joaquín Fernández, Carlos [et al.]. "Positioning of enhanced monofocal intraocular lenses between conventional monofocal and extended depth of focus lenses: a scoping review". BMC ophthalmology [on line]. 2023, vol. 23, núm. 10, p. 2-111 [Consultation: 17/09/2024]. Available on: https://doi.org/10.1186/s12886-023-02844-1.- Breyer, Detlev R.H. [et al.]. "Multifocal intraocular lenses and extended depth of focus intraocular lenses". Asia-Pacific journal of ophthalmology [on line]. 2017, vol. 6, núm. 4, p. 339-349 [Consultation: 17/09/2024]. Available on: https://doi.org/10.22608/APO.2017186.