

# Course guide 370012 - INSTRUMOPT - Optometrics Instruments

### Last modified: 23/09/2024

Unit in charge: Teaching unit:	Terrassa School of Optics and Optometry 731 - OO - Department of Optics and Optometry.		
Degree:	BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Compulsory subject).		
Academic year: 2024	ECTS Credits: 6.0	Languages: Catalan	

### **LECTURER**

Coordinating lecturer:	Núria Tomas Corominas, TU
	(http://futur.upc.edu/NuriaTomasCorominas

#### **Others:**

### **PRIOR SKILLS**

Have solid knowledge of Geometric Optics, Instrumental Optics and Visual Optics.  $\hat{a} \Box \Box$ 

### REQUIREMENTS

Having studied geometric optics, photometry and instruments and visual optics

### **DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**

#### **Specific:**

CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.

CE07. (ENG) The ability to understand and manage basic laboratory materials and techniques.

CE09. (ENG) The ability to understand the principles, descriptions and characteristics of basic optical instruments and the instruments used in optometric and ophthalmic practice.

CE22. (ENG) Conèxier i aplicar ajudes òptiques i no òptiques per a la baixa visió.

### Generical:

CG5. Give opinions and produce reports and expert reports when necessary.

CG6. Assess and incorporate the technological improvements necessary to properly carry out professional activities.

CG8. Plan and carry out research projects that contribute to the production of knowledge in the field of optometry and disseminate this scientific knowledge via the typical communication channels.

CG9. Expand and update one's professional abilities through continuing education.

### Transversal:

CT7. Foreign language. Demonstrate knowledge of a foreign language, preferably English, at an oral and written level that is consistent with graduates' future needs.

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.



# **TEACHING METHODOLOGY**

MD1 - Participatory lecture class of theoretical and practical content

MD2 - Active methodologies in the classroom (project-based learning (PBL), case studies, role-playing games, cooperative learning, ...)

MD3 - Practical class of resolution, with the participation of the students, of practical cases and / or exercises related to the contents of the subject

MD4 - Laboratory practices

# LEARNING OBJECTIVES OF THE SUBJECT

Objectiu: TO get knowledge about fundamental optical and optometric instruments

### **STUDY LOAD**

Туре	Hours	Percentage
Hours medium group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

# CONTENTS

### **1.- INTRODUCTION TO OPTOMETRIC INSTRUMENTS**

### **Description:**

Fundamental concepts General characteristics of optical instruments

### **Specific objectives:**

Review of general concepts and fundamental characteristics of basic instruments, as well as geometric optics tools that are the basis for understanding the most common optometric instruments

**Related activities:** Problem sessions.

**Full-or-part-time:** 10h Practical classes: 2h Laboratory classes: 2h Self study : 6h



### 2. INSTRUMENTATION FOR LOW VISION

### **Description:**

Introduction to low vision Instrumentation for distant vision: Galileo and Kepler eyepiece adapted to low vision Instrumentation for close vision: Loupe and Telemicroscope

### Specific objectives:

Know the basic optical instrumentation used in low vision Knowing how to calculate the most relevant parameters of the instruments (magnification, field, clarity and resolution) for good use in low vision environments. Distinguish its characteristics and for the most appropriate uses

#### **Related activities:**

Problem sessions. Laboratory sessions Search for commercial and scientific information on optometric instruments

### Full-or-part-time: 40h

Practical classes: 6h Laboratory classes: 10h Self study : 24h

### **3 INSTRUMENTATION FOR COMPENSATING ELEMENTS**

**Description:** focimeter Automatic focimeter

### **Specific objectives:**

Get to know the basic instrument used to measure the parameters of ophthalmic lenses: the focimeter Understand how these measurements are made, emphasizing the sources of error

### **Related activities:**

Problem sessions. Laboratory sessions Search for commercial and scientific information on optometric instruments

### Full-or-part-time: 15h

Practical classes: 2h Laboratory classes: 4h Self study : 9h



### **4 INSTRUMENTATION FOR THE STUDY OF OCULAR STRUCTURES**

### **Description:**

Ophthalmoscope and direct and indirect ophthalmoscopy retinographer Retina Analyzers (OCT) Other fundus observation techniques Ocular biomicroscope

### **Specific objectives:**

Know the basic optical instrumentation used to observe the ocular structures: anterior segment and retina Understand the composition, operation and main characteristics of a biomicroscope, both the observation system and the lighting system

Understand the basic techniques of ophthalmoscopy and their applications in different instruments. Understand the basics of advanced retinal analysis and observation techniques ( OCT )

### **Related activities:**

Problem sessions. Laboratory sessions Search for commercial and scientific information on optometric instruments

Full-or-part-time: 52h 30m Practical classes: 13h Laboratory classes: 8h Self study : 31h 30m

### **5 INSTRUMENTATION FOR EYE MEASUREMENTS**

### **Description:**

keratometer Corneal topographers as analyzers of the anterior segment

#### **Specific objectives:**

Know the different instruments used to measure corneal parameters, mainly the keratometer and the different types of topographers

Understand how different corneal measurements are captured and how corneal maps are made and what the differences are between them

### **Related activities:**

Laboratory sessions Search for commercial and scientific information on optometric instruments

### Full-or-part-time: 22h 30m

Practical classes: 5h Laboratory classes: 4h Self study : 13h 30m



### **6 INSTRUMENTATION FOR THE DETERMINATION OF THE REFRACTIVE STATE OF THE EYE**

### **Description:**

Retinoscope and retinoscopy Automatic refractometers

### Specific objectives:

Know both the composition of the instrument and its operation Understand why the different movements occur when doing retinoscopy, linked to the patient's ametropia Introduction to autorefractometers, conditions of use and comparison between the different instruments for determining the refractive state of the eye

#### **Related activities:**

Search for commercial and scientific information on optometric instruments

Full-or-part-time: 10h Practical classes: 2h Laboratory classes: 2h Self study : 6h

# **ACTIVITIES**

### **1.- LABORATORY PRACTICES**

### **Description:**

Optical bench construction of some studied optometric instruments, analysis of their characteristics, properties and benefits. The practice sessions are held in the Optometric Instruments laboratory in the TR8 building.

The development of a practice session is in pairs, with a duration of 2 hours.

Before the start of the practice session, an activity preparation sheet must be handed in with a short report of the instrument that will be simulated in the laboratory that will be evaluated

At the end of the practice, a summary of results sheet containing the results obtained must be given.

The evaluation is done through two test-type tests, one in the middle of the semester and the other at the end of the semester.

### **Specific objectives:**

Encourage the study of the basic concepts of each instrument through prior preparation of the practice. To help understand the composition, operating system and characteristics of optometric instruments and associated techniques. Foster the ability to synthesize through summaries and enhance group work.

### Material:

Available at Athena

Detailed script with the general objectives, material used, specific objectives and development of the practice Results summary sheet.

Activity preparation sheet

The instruments laboratory has all the necessary material for carrying out all the practices.

### **Delivery:**

Before starting the session, the students must hand in a practical preparation sheet, which highlights their previous knowledge of the instrument. This worksheet is cross-corrective, that is, each student corrects the one of a randomly chosen classmate. At the end of each session, each student must hand in the summary of results corresponding to the practice done in the laboratory. This sheet will be returned to the student at the time of the practical assessment for use during the assessment.

### Full-or-part-time: 50h

Laboratory classes: 50h



### name english

**Full-or-part-time:** 25h Self study: 15h Laboratory classes: 10h

### name english

Full-or-part-time: 10h Self study: 6h Laboratory classes: 4h

#### **Europena Diploma**

### **Description:**

This module contributes to the European Diploma in Optometry competencies indicated in the following link: https://drive.google.com/drive/folders/1bwmHBsvkrGnY63DfXAnWZB\_i0I2pXa-I?usp=drive\_link

### **Related competencies :**

CE09. (ENG) The ability to understand the principles, descriptions and characteristics of basic optical instruments and the instruments used in optometric and ophthalmic practice.

### Full-or-part-time: 1h

Guided activities: 1h

# **GRADING SYSTEM**

The final grade (QF) is the sum of the following partial grades: QF=TiP1\*0.3+ TiP2 \*0.3+ PR1\*0.11+PR2\*0.11+ PP\*0.03+ IC\*0.15 TiP1: First Partial Exam (theory and problems) (30%). Exam short questions and problems TiP2: Second Partial Exam (theory and problems) (30%). Exam short questions and problems PR1: First practice exam (11%) Test-type exam PR2: Second practice exam (11%) Test-type exam PP: Practice preparation sheet (3%) IC: Work on Commercial Instruments (15%) delivered at the end of the course. Evaluation of CT2

CT evaluation

CT2- Sostenibilidad y Compromiso Social.: in the IC work (commercial instruments,) must include a reflection section on the sustainability of the instrument considering consumption, the waste it can generate, how to treat this waste, the equal opportunities in the environment of the use of the instrument. Not including this section will penalize the grade by 10% CT6- Independent Learning will be assessed through the delivery of the practice preparation sheet (PP)

CT7- Third language. In the IC work, a summary in a third language will be requested. Not including this section will penalize the grade by 10%

Evaluation of the competences of the DE

1 Geometrical Optics Knowledge 10 ophthalmic and optical instruments is worked on throughout the subject, therefore the evaluation of this competence is transversal to the entire subject

Re-evaluation: in case of re-evaluation, there will be a written examination of theory and problems with a value of 100%



# **EXAMINATION RULES.**

It is necessary to attend 100% of practices"

- It is necessary to attend 80% of practical case and problem sessions
- A form is available for all assessment tests, which will be delivered together with the assessment test

# BIBLIOGRAPHY

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- Martínez Corral, M. [et al.]. Instrumentos ópticos y optométricos: teoría y prácticas. València: Universitat de València, 1998. ISBN 8437034906.

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