

## 370511 - INSTRUMENT - Optometric Instruments

Coordinating unit: 370 - FOOT - Terrassa School of Optics and Optometry  
Teaching unit: 731 - OO - Department of Optics and Optometry  
Academic year: 2019  
Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2009). (Teaching unit Compulsory)  
ECTS credits: 6 Teaching languages: Catalan

### Teaching staff

Coordinator: Tomas Corominas, Nuria (<http://futur.upc.edu/NuriaTomasCorominas>)  
Others: Tomas Corominas, Nuria (<http://futur.upc.edu/NuriaTomasCorominas>)  
Aldaba Arevalo, Mikel  
Alvarez Muñoz, José Luis

### Degree competences to which the subject contributes

#### Specific:

1. Technical english applied to optics and optometry
4. Understanding the mechanism of imaging and information processing in the visual system.
6. Determine, according to the visual limitations, optical aids for each case.
11. Identify the design and features of different specific aid for low vision.
13. Measure of ocular parameters presurgical of the patient
16. Being able to take, treat, represent and interpret experimental data. "Use basic laboratory equipment and techniques"
17. Value and report on the possibilities and limitations of specific visual aids for low vision.

#### Generical:

19. Develop methods to encourage teamwork participation of its members, critical thinking, mutual respect, the ability to negotiate to achieve common goals
20. Judgments (ratings) reports and surveys
21. Display information orally and in writing of reasonably and coherent.
22. Extract the main points of a text or any source of information (oral or written)
23. Encourage methodical work, rigorous, consistent and innovative
24. Reflect and be able to make a critic of the knowledge and developed skills and the level of achievement.
25. Synthesize and organize information to convey it effectively orally and / or written
26. Locate new information and the interpretation of it in its context.
27. Working with evidence, methodology and rigour.

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28. Value the methods used to achieve the objectives.
29. Value and incorporate technological necessary improvements for the proper development of the profession
30. Assessing the acquisition of the course objectives.

### Teaching methodology

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### Learning objectives of the subject

- Detailed study of the composition, operation system and characteristics of instruments used in the exercise of the profession of optometry and techniques associated
- Understand the principles, the description and the fundamental characteristics of optical instruments and instruments used in ophthalmic and optometric practice.
- Understand and make use of the material and the basic techniques of the laboratory.
- Know and apply the optical and non optical aids for low vision.
- Know and apply the manufacturing techniques of visual aids and optometric and optical instruments.
- Understand the process of image formation and properties of optical systems.
- Understand and calculate the geometric parameters, the most important optical and physical characteristic of the optometric instruments.
- Understand the propagation of light in isotropic media, the light-matter interaction, interference, light diffraction phenomena, the properties of surface monolayers and multilayers and the principles of lasers and their applications.
- To manage and techniques for analysis, measurement, control and correction of the effects of optical systems for compensating the visual system, in order to optimize the design and adaptation of them.
- To qualify for the calculation of geometric parameters of specific visual compensation systems: low vision, intraocular lenses, contact lenses and ophthalmic lenses.
- Know the aberrations of optical systems.
- Learn the basics and radiometric and photometric laws.
- Understand the parameters and models eye.
- Understand the factors that limit the quality of the retinal image.
- Acquire skills to the test instrument for assessing visual function and eye health.
- Ability to measure, interpret and treat refractive defects.
- Understand current techniques of eye surgery and the ability to carry out eye tests included in the pre-and postoperative examination.
- To implement and interpret the evidence related to the instrumental visual health problems.
- Understand and use clinical protocols and instrumental exploration associated with the adaptation of contact lenses.
- Apply techniques of controlled modification of the corneal topography with the use of contact lenses.

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### Study load

Total learning time: 144h	Hours large group:	0h	0.00%
	Hours medium group:	32h	22.22%
	Hours small group:	28h	19.44%
	Guided activities:	0h	0.00%
	Self study:	84h	58.33%

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### Content

<p>1. INTRODUCTION TO OPTOMETRIC INSTRUMENTS</p>	<p>Learning time: 9h Theory classes: 0h Practical classes: 2h Laboratory classes: 2h Guided activities: 0h Self study : 5h</p>
<p>Description: - Basics - General characteristics of optical instruments</p> <p>Related activities: Laboratory.</p>	
<p>2. INSTRUMENTATION FOR LOW VISION</p>	<p>Learning time: 32h Theory classes: 0h Practical classes: 6h Laboratory classes: 8h Guided activities: 0h Self study : 18h</p>
<p>Description: - Introduction - Galileantelescopes - Magnifiers - Low vision aids</p> <p>Related activities: Laboratory, seminars and case studies of information seeking optometric instruments.</p>	
<p>3. INSTRUMENTATION FOR COMPENSATOR ELEMENTS</p>	<p>Learning time: 16h Theory classes: 0h Practical classes: 4h Laboratory classes: 2h Guided activities: 0h Self study : 10h</p>
<p>Description: - Lensmeter - Automatic Lensmeter</p> <p>Related activities: Laboratory, seminars and case studies of information seeking optometric instruments.</p>	

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<p>4. INSTRUMENTATION FOR THE STUDY OF THE EYE STRUCTURES</p>	<p>Learning time: 37h Theory classes: 0h Practical classes: 7h Laboratory classes: 8h Guided activities: 0h Self study : 22h</p>
<p>Description: - Ophthalmoscope and the direct and indirect ophthalmoscopy - Fundus Camera - Ocular biomicroscopy - retina analyzers (OCT)</p> <p>Related activities: Laboratory, seminars and case studies of information seeking optometric instruments.</p>	
<p>5. INSTRUMENTATION FOR MEASURES EYES</p>	<p>Learning time: 28h Theory classes: 0h Practical classes: 5h Laboratory classes: 6h Guided activities: 0h Self study : 17h</p>
<p>Description: - keratometer - Autokeratometers -Topographers</p> <p>Related activities: Laboratory, seminars and case studies of information seeking optometric instruments.</p>	
<p>6. INSTRUMENTS FOR DETERMINING THE REFRACTIVE STATE OF THE EYE</p>	<p>Learning time: 9h Theory classes: 0h Practical classes: 3h Laboratory classes: 0h Guided activities: 0h Self study : 6h</p>
<p>Description: - Retinoscopy - Autorefractometers</p> <p>Related activities: Finding information optometric instruments.</p>	



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### Planning of activities

<h4>1. LABORATORY PRACTICES</h4>	<p>Hours: 32h Laboratory classes: 14h Self study: 18h</p>
<p><b>Description:</b> Construction optical bench of some optometric instruments studied, analysis of its characteristics, properties and performance. The practical sessions are held in the laboratory of optometric instruments Building TR8. The development of a practice session is in pairs, with a duration of 2 hours. The laboratory should carry out the experimental part and must submit a summary of the development of it and stating the results. The evaluation is done by two multiple choice tests in a semester and the other half at the end of it.</p> <p><b>Support materials:</b> Written with the general objectives detailed, material used, specific objectives and development of practice and summary sheet available on Atenea. In the laboratory instruments are available all the material necessary for the conduct of all practices.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b> Each student must submit the summary sheet that correspond to each practice to make laboratory and will be reviewed by the teacher. In addition, the professor returned students in the time of assessment practices for use during the evaluation.</p> <p><b>Specific objectives:</b> To promote the study of the basics of each instrument in preparation for practice. To help understand composition, system performance and characteristics of optometric instruments and techniques associated. Develop the capacity of synthesis through the abstracts and promote teamwork.</p>	
<h4>2. SEMINARS CASE STUDIES</h4>	<p>Hours: 18h Laboratory classes: 8h Self study: 10h</p>
<p><b>Description:</b> Presentation and discussion of case studies related to optometric instruments studied: field, clarity, and increase the intrinsic parameters of the instruments. The seminars are held in the laboratory, optometric instruments TR8 of the building. The duration is 2 hours. The development is done in pairs and ends with a general discussion. The teacher must guide the seminar and resolve problems and questions that arise, has always encourage cooperation between students and the interactions between them. The evaluation is done by both theoretical and practical examinations that are half-semester and end of it.</p> <p><b>Support materials:</b> List of case studies with and without the proposed solutions are available on Atenea. Forms and patterns needed to solve the case studies are available on Atenea.</p> <p><b>Descriptions of the assignments due and their relation to the assessment:</b> At the end of each session the group discussed with the methods to be used to settle the case proposed. No deliveries. The concepts used in case studies and their application are essential to solve the problems of the test.</p>	

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### Specific objectives:

To promote the study of the basics of each instrument through the preparation and resolution of practical cases.  
To help understand composition, system performance and characteristics of optometric instruments and techniques associated.  
Develop the capacity of abstraction and resolution of related case studies and / or derivatives in the use of optometric instruments.

### 3. SEARCH COMERCIAL AND SCIENTIFIC INFORMATION OF OPTOMETRIC INSTRUMENTATION

Hours: 9h

Laboratory classes: 4h

Self study: 5h

#### Description:

Find and analyze information from commercial optometric instruments.

Extract relevant information from optical catalogs and websites of various commercial optometric instruments.

#### Support materials:

Detailed Written with the general objectives and instruments to extract the relevant information from optical character. Available in Athena.

Computer with Internet connection.

#### Descriptions of the assignments due and their relation to the assessment:

Each student must prepare a short manuscript which must include information on all instruments specified in the script to be delivered at the beginning of the review of practices and uses for assessment practices.

#### Specific objectives:

Become familiar with the optometric instruments

Develop the capacity of analysis and abstraction to the abundant information provided by current feeds.

Introduction to EBP (Evidence Based Practice)

## Qualification system

The evaluation will be based on continuous assessment.

We start the course in two parts. Each part is a test of theory, problems and practices.

Theory: Realization of two individual written tests. The tests consist of several questions about the theoretical concepts of the subject. The weight of evidence theory are 15 % each The theory is a total of 30% of the total course grade.

Practices: Making two individual multiple choice tests of basic concepts associated with the practice. The weight of the two practice tests are 10% each. Also be assessed an activity aimed presented at the end of the course and has a weight of 10%. The total number of practices is 20% of the total course.

Problem: Performance of two individual written tests. The tests are based on the resolution of a number of problems. The weight of the two test problems are of 15% each . The total number of problems is 30% of the total course.

Other activities : Two activities will be performed along the academic year eitha weight of 10% each . The total for those activities is is 20% of the total course.

## Regulations for carrying out activities

- Is a necessary condition to submitte the examination of the praftical part, participating in all the linked activities

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### Bibliography

#### Basic:

Henson, David B. Optometric instrumentation. 2nd ed. Oxford: Butterworth-Heinemann, 1996. ISBN 0750607270.

Smith, G.; Atchison, D.A. The eye and visual optical instruments. Cambridge: Cambridge University Press, 1997. ISBN 0521478200.

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

Kaschke, M.; Donnerhacke, K.H.; Stefan, M. Optical devices in ophthalmology and optometry: technology, design principles and clinical applications. Weinheim: Wiley-Vch, 2014. ISBN 9783527410682.

#### Complementary:

Arasa, J.; Arjona, M.; Tomàs, N. Instruments òptics i optomètrics: problemes. 2a ed. Barcelona: Edicions UPC, 1994. ISBN 847653423X.

#### Others resources: