COURSE DATA

DATA SUBJECT

Code: 34311
Name: Clinical exploration methods
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Facultat de Física	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	Ocular pathology and pharmacology	COMPULSORY

COORDINATION

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SUMMARY

Methods of clinical examination is a compulsory subject is currently taught the first semester of fourth year of undergraduate studies of Optometry. Intended as an introduction to advanced techniques for invasive clinical diagnosis based on knowledge introduced in the Optics and Visual Perception matters, emphasizing the principles of design of devices and the requirements for proper use

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PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

To take this course it is necessary to have acquired knowledge of Mathematics, Physics, Physiological

Optics, Optics, Optometry and Visual Perception, and Ocular Pharmacology and Pathology courses.

COMPETENCES / LEARNING OUTCOMES

1207 - Degree in Optics and Optometry

Acquire basic skills to handle specialized instruments.

Being able to gather and interpret relevant data to make judgments.

Being able to transmit information, ideas, problems and solutions to both a specialized and non-specialized audience.

Development of learning skills necessary to undertake further studies with a high degree of autonomy.

Knowing how to apply the knowledge acquired to professional activity, knowing how to solve problems and develop and defend arguments.

To apply standard psychophysical techniques to characterize anomalous visual systems.

To have and to understand the fundamentals of Optometry for its correct clinical and healthcare application.

To know and to apply the procedures and indications of the different methods of clinical examination and complementary diagnostic techniques.

To know how to interpret the results of the measurements taken.

To know some of the most common psychophysical techniques in clinical practice.

To know the applicable legislation in professional practice, with special attention to matters of gender equality between men and women, human rights, solidarity, sustainability, protection of the environment and promotion of the culture of peace.

To know the fundamentals of the latest generation instruments for the diagnosis of ocular pathologies.

To know the properties and functions of the different elements that make up the visual system.

To know the symptoms of visual diseases and to recognize the signs associated with them. To recognize the alterations that modify normal functioning and trigger pathological processes that affect vision.

DESCRIPTION OF CONTENTS

1. Introduction

2. Mathematical preliminary

2.1.-Trigonometric or Harmonic functions
2.2.-Complex numbers
2.3.-RECT function and CIRCLE function
2.4.-Dirac Delta Function ¿ (x)
2.5.-The convolution operation
2.6.-Periodic Functions (Fourier Series)
2.7.-Non-periodic functions. The 1D Fourier Transform

3. Propagation of a light beam.

3.1.- Introduction
3.2.- Light waves
3.3.- Interferences
3.4.- Propagation of light beams
3.5.- Transmission through optical elements: thin lens
3.6.- Ability of lenses to make a Fourier transform

4. 2D imaging
Two-dimensional imaging.

4.1.-Introduction
4.2.-Formation of 2D images with coherent light:
4.3.-Formation of images with incoherent light

5. Optical systems based on wavefront analysis
Barrido confocal ophtalmocscope.

5.1.-Review of aberrations
5.2.-Mathematical description of aberrations

5.3.-Double step systems
5.3.1.-Direct measurement of the PSF
5.3.2.-Hartmann Systems - Shack
5.4.-Corneal surveyors
5.5.-Optical coherence tomography

6. Basic design principles of psychophysical tests for diagnosis.

6.1. Introduction

6.2. Hypothesis of Selective Damage and Hypothesis of Redundancy Reduction

6.3. Aspects to Consider in the Design of a Psychophysical Test for Diagnosis

6.4. Factors That Distort a Psychophysical Measurement

6.5. Analysis of the Results of a Psychophysical Test

7. Tests of color vision

7.1. General Design Principles. Factors Affecting Test Results

7.2. Congenital Color Vision Defects: Monochromacy, Dichromacy, and Chromatic Anomalies

7.3. Acquired Color Vision Defects

7.4. Anomaloscope

7.5. Pseudoisochromatic Test

7.6. Ordering Test

7.7. Threshold Measurement Test

8. Incremental threshold perimetry I: Fundamentals

8.1. General Design Principles

8.2. Factors Affecting the Results of a Campimetry

8.3. Quality Control of Measurement

8.4. Kinetic Campimetry

8.5. Static Campimetry (SAP)

8.6. Results of a Campimetry

8.6.1. Sensitivity Map

8.6.2. Total and Corrected Difference Map

8.6.3. Global Indicators

8.6.4. Bebie Curve

9. Campimetry II: Analysis of results

9.1. Importance of Measuring Contrast Sensitivity

9.2. General Design Principles. Spatial, Temporal, and Chromatic CSF

9.3. Factors Affecting CSF Measurement

9.4. Tasks and Commercialized Tests

9.5. Sensitivity Measurements According to Eccentricity

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	7,50
Theory	30,00
Other activities	7,50
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	22,50
Independent study and work	0,00
Preparation of lessons	31,00
Preparation for assessment activities	10,00
Resolution of case studies	4,00
Total hours	**67,50**

TEACHING METHODOLOGY

The course will consist of four types of classes with differentiated methodology:

(i) Theoretical-practical classes

(ii) Guided Problem solving

(iii) Tutorials

(iv) Laboratory sessions

In the type classes (i) the basic theoretical contents of the subject will be taught, as well as the practical examples that best illustrate them. In order to increase the presentation/assimilation ratio, graphical tools may be used to present the contents, through transparencies, including graphs, drawings, videos and animations, in combination with discussions/presentations on the blackboard. Simple practical demonstrations, particularly relevant examples, applets, simulations, etc., may also be presented to illustrate some of the concepts explained. Students will be encouraged and guided in the extension of the contents received in each class by means of the recommended bibliography, as well as in the possibility of extending their knowledge in future subjects. The type classes (ii) will include three types of activities: 1) solving exercises, 2) bibliography discussion sessions, previously assigned to different groups of students, and 3) carrying out simulations -directed by the teaching staff-. Supervised work (iii) consists of the discussion of scientific articles of particular relevance to the contents of the subject and also the resolution of theoretical-practical questions in the classroom. This bibliography will be previously assigned to different study groups and the conclusions will be presented in practical blackboard class sessions (iii). Finally, in the practical laboratory classes (iv), students will work with different diagnostic devices, both of the optical part of the visual system and of the neuronal part, in groups, and carry out the specific tasks assigned to each device.

EVALUATION

The subject is divided into two blocks, Optical Methods and Psychophysical Methods, with equal weight in the final evaluation.

In the first session of the course, the evaluation will be carried out based on the following elements:

1. Theory and Problem Exam: The theoretical exam will have two parts, one related to optical methods and another related to psychophysical methods. Each part has a final weight of 25% in the subject (this section accounts for 50% of the final grade).

2. Supervised Work: The evaluation of supervised work may consist of solving theoretical-practical questions that can be assessed through audiovisual or sound methods, which will not be made public and will only be used by the faculty for evaluation purposes. This part of the evaluation is continuous and non-recoverable, with a weight of 30% in the final grade (15% for the optical part and 15% for the psychophysical part).

3. Laboratory Grade: Activities and a theoretical exam will be conducted, with a total weight of 20% in the final grade (10% for the optical part and 10% for the psychophysical part). The evaluation of the in-person component is mandatory and non-recoverable.

In all sections, students must obtain at least 3 out of 10 to be averaged with the other parts of the subject. Even if the average score is passing (5.0 or higher), a score below 3 in any section will prevent passing the subject.

The final grade for the subject will be calculated as follows:

Final Grade = 0.25*(Optical Methods Theory Grade) + 0.25*(Psychophysical Methods Theory Grade) + 0.15*(Optical Methods Seminar Grade) + 0.15*(Psychophysical Methods Seminar Grade) + 0.10*(Optical Methods Laboratory Grade) + 0.10*(Psychophysical Methods Laboratory Grade)

For the second session, grades from each block can be retained, but only if they are equal to or greater than 5.0. In this session, only written theory and problem exams and laboratory tests with grades below 5.0 will be conducted. Based on these exam results, two alternative grades are calculated:

1. First Grade, which considers the results of continuous assessment. In this case, the final grade is calculated the same way as in the first session:

Final Grade = 0.25*(Optical Methods Theory Grade) + 0.25*(Psychophysical Methods Theory Grade) + 0.15*(Optical Methods Seminar Grade) + 0.15*(Psychophysical Methods Seminar Grade) + 0.10*(Optical Methods Laboratory Grade) + 0.10*(Psychophysical Methods Laboratory Grade)

2. Second Grade, which only considers theory exams and laboratory scores. In this case, the final grade is:

Final Grade = 0.40*(Optical Methods Theory Grade) + 0.40*(Psychophysical Methods Theory Grade) + 0.10*(Optical Methods Laboratory Grade) + 0.10*(Psychophysical Methods Laboratory Grade)

To apply either of these calculations, students must obtain at least 3 out of 10 in each exam taken in this session (not in retained grades, which must be above 5). A score below 3 in any evaluation element will prevent passing the subject.

The final grade for the second session will be the higher of these two calculations. As in the first session, a minimum score of 5.0.

REFERENCES

- Reference b1: J.W. Goodman, Introduction to Fourier Optics (McGraw-Hill, 1996). Reference b2: Schwartz J. S., Visual perception : a clinical orientation, MacGraw-Hill, 1999. Referencia b3: De

Fez Saiz, D., Viqueira Pérez, V. Fundamentos de percepción visual. Alicante: Servicio de Publicaciones de la Universidad de Alicante, 2014. ISBN 978-84-9717-299-8 Disponible en formato electrónico en http://rua.ua.es/dspace/handle/10045/52126

- Reference c1: Selected articles from various specialized journals: Vision Research, Opthalmic and Physiological Optics, Optometry and Vision Science, Investigative Ophthalmology and Vision Science, etc