VNIVERSITAT DE VALÈNCIA

Course Guide
34319 Psychophysical methods for the detection and monitoring of visual pathologies

COURSE DATA

DATA SUBJECT

Code: 34319
Name: Psychophysical methods for the detection and monitoring of visual pathologies
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

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	Visual perception: mechanisms and clinical applications	ELECTIVES

COORDINATION

LUQUE COBIJA M JOSEFA

SUMMARY

This subject studies in depth the methodology for designing psychophysical tests for assessing the visual system (VS), a matter that was presented in simplified form in the subject Clinical Exploration Methods. The students must apply their knowledge of the function and structure of the visual system, acquired in their previous work with other subjects, to the design of the measurement method, the characteristics of the stimuli used, the definition of normal limits and the analysis of the test performance

The contents are grouped in three great blocks. In the first block, we study the problems posed by test design (aim of the test, stimulus, task and measurement method, determination of the normal limits), including the physical implementation in a particular device (a computer controlled monitor, for instance). The second block revises a set of tests, grouped by their principle of design, that are successfully used in detection of visual deficits. In the last block, a brief revision of the statistical procedures used to extract information from experimental results is made.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Students need a basic knowledge of Optometry, Visual Perception, Patology and Biostatistics. Ideally, they should also take the subjects Vison of Color and Form and Vision of Movement and Depth.

COMPETENCES / LEARNING OUTCOMES

1207 - Degree in Optics and Optometry

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 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 psychophysical methods of clinical examination and complementary diagnostic techniques.

To know how to analyze and to discuss the diagnostic implications of the results of a psychophysical experiment.

To know how to design and to implement psychophysical tests for the diagnosis of alterations of the visual system.

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.

DESCRIPTION OF CONTENTS

1. Stimulus choice and description

Describing the stimulus spatio-temporal characteristics: the spatio-temporal domain and the frequency domain. Describing the stimulus chromatic content: lineal representation spaces. Criteria for choosing the chromatic content and spatio-temporal profile of a stimulus. Test design strategies.

2. Stimulus generation

Characterization of a device for stimulus generation. Limitations of the stimulus visualization devices. Exercise: generating stationary and motion stimuli in a monitor.

3. Clinical Psychophysical Methods

Staircase procedures. Forced choice procedures. PEST. ZEST. MOBS. Other adaptive methods. Measures of reliability of a psychophysical procedure.

4. Defining the standard observer and results analysis.

Defining the standard observer. Statistical procedures for comparison between standard observer and individual patients. Test performance evaluation.

5. Revision of different tests for clinical psychophysics

Luminous sensitivity tests. Color vision tests. Spatial vision tests. Flicker and movement tests.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	15,00
Theory	30,00
Laboratory	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	50,00
Independent study and work	0,00
Preparation of lessons	30,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

After a brief exposition of the subject matter, the students will perform small, experiments, solve problems and work in the design of a psychophysical test. Laboratory sessions will be devoted either to work with standard clinical devices or to the guided design of a psychophysical test.

EVALUATION

The grade will be calculated as 0.8*Test+0.2*Assignments. The "Assignments" assessment block comprises the set of tasks proposed during the course, completed individually by students. The "Test" assessment block consists of the completion and presentation of a group project (maximum 4 people) in which a diagnostic test for visual anomalies will be developed. The "Test" block will assess the design and construction process of the diagnostic test (50%) and an interview with the professor at the end of the course (50%), where students will present their test, discuss the design process, and show the results obtained with a normal population and a small group of anomalous observers, real or simulated.

Each of the assessment blocks, "Test" and "Assignments," must achieve a minimum score of 3/10 for the final grade to be calculated. In the first sitting, if the minimum grade of 3/10 is not achieved in the "Assignments" block only, the final grade will be calculated as 0.8*Test. In the second sitting, any assessment block with a grade lower than 5 must be retaken. To retake the "Assignments" block, students will be assigned a representative assignment from those completed during the course. To retake the "Test" block, students must resubmit a diagnostic test design for visual anomalies (a corrected version of the one submitted in the first sitting, if the student failed, or a new test, if the student did not present a test). The final grade will be calculated as in the first sitting.

REFERENCES

- **Reference b1:** Norton T. T., Corliss D. A., Bailey J. E. Fundamentals of Visual Psychophysics, Elsevier, 2000. **Reference b2:** Birch, J. Diagnosis of Defective Colour Vision, Butterworth-Heineman, 2001. **Reference b3:** Cronly¿Dillon J. R. (Ed.) Vision and Visual Dysfunction, MacMillan Press, 1991.
- **Reference c1**:Shapley R. y Man-Kit Lam D., eds., Contrast Sensitivity, The MIT Press, 1993. **Reference c2:** Rowe F., Visual Fields Via The Visual Pathway, Blackwells, 2006.