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	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Faculty of Physics	4	First term

Subject-matter

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	16 - Optional subjects	Optional
1207 - Degree in Optics and Optometry	20 - Visual perception: mechanisms and clinical applications	Optional

Coordination

Name	Department
LUQUE COBIJA, M JOSEFA	280 - Optics and Optometry and Vision Sciences

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

The students should be familiar with the contents of the subject matter of Optometry, Visual Perception and Pathology, and with the subject Biostatistics. In an ideal scenario, they should also have studied Vision of shape and color and Vision of movement and depth

OUTCOMES

1207 - Degree in Optics and Optometry

- To have and to understand the fundamentals of Optometry for its correct clinical and healthcare application.
- Knowing how to apply the knowledge acquired to professional activity, knowing how to solve problems and develop and defend arguments.
- 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.
- 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 how to design and to implement psychophysical tests for the diagnosis of alterations of the visual system.
- To know how to analyze and to discuss the diagnostic implications of the results of a psychophysical experiment.
- To know and to apply the procedures and indications of the different psychophysical methods of clinical examination and complementary diagnostic techniques.

LEARNING OUTCOMES

To apply the previous knowledge on the VS to the analisis and dessign of psychophysical tests for detection, assessment and follow-up of visual pathologies.

To understand the different stages involved in the design of a psychophysical test, to the point of being able to direct the construction of one and even of constructing one themselves, using simple procedures.

Accquire a minimum skill in adminestering psychophysical tests for clinical and lab use.

Being able to analize and discuss the diagnostic implication of the results obtained in a psychophysical experiment.

To know and to be able to apply correctly different psychophysical methods for clinical use and their complementary diagnosis procedures.

Being able to make a justified choice of the psychophysical technique more suitable for a given patient or suspected pathology.

To know the optimal conditions for administering different tests and their limitations.

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. Tests used in clinical psychophysics.

Color vision tests. Spatial vision tests. Motion vision tests. Psychophysical tests combined with neuroimaging techniques.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Tutorials	15,00	100
Laboratory practices	15,00	100
Development of group work	50,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	**150,00**	

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 qualification is computed as

0.8*Test+0.2*Assigned Tasks, if Assigned Tasks>3

0.8*Test otherwise

Assigned Tasks: exercises proposed during the term, solved by each student

Test: Design of a psychophysical test for detection of visual anomalies. This task is performed in groups of, at most, 4 students. The evaluation of this task is as follows: 50%: evaluation of the process of design of a psychophysical test, in groups of four students. 50%: explanation of the process of design and construction of the test, with results for normal and pathological observers.

REFERENCES

Basic

- Schwartz J. S., Visual perception : a clinical orientation, MacGraw-Hill, 1999.
  Norton T. T., Corliss D. A., Bailey J. E. Fundamentals of Visual Psychophysics, Elsevier, 2000.
  Assembly of Behavioral and Social Sciences, National Research Council. Procedures for Testing Color Vision. Report of Working Group 41. Academy Press, 1981.
  Birch, J. Diagnosis of Defective Colour Vision, Butterworth-Heineman, 2001.
  Shapley R. y Man-Kit Lam D., eds., Contrast Sensitivity, The MIT Press, 1993.
  Anderson R. y Patella V.M., Automated Static Perimetry, Mosby, 1999
  Rowe F., Visual Fields Via The Visual Pathway, Blackwells, 2006.
  CronlyDillon J. R. (Ed.) Vision and Visual Dysfunction, MacMillan Press, 1991.
- Artículos seleccionados de distintas revistas especializadas: Vision Research, Opthalmic and Physiological Optics, Optometry and Vision Science, Investigative Ophthalmology and Vision Science, etc

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available