VNIVERSITAT DE VALÈNCIA

Course Guide
34311 Clinical exploration methods

COURSE DATA

Data Subject	
Code	34311
Name	Clinical exploration methods
Cycle	Grade
ECTS Credits	4.5
Academic year	2023 - 2024

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	15 - Ocular pathology and pharmacology	Obligatory

Coordination

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

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

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 students must have completed the subjects Mathematics, Physics, Physiological Optics, Optics, Optometry and Visual Perception, and Ocular Pharmacology and Pathology courses.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

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 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.
- To know and to apply the procedures and indications of the different methods of clinical examination and complementary diagnostic techniques.
- To know some of the most common psychophysical techniques in clinical practice.
- To apply standard psychophysical techniques to characterize anomalous visual systems.
- To know the fundamentals of the latest generation instruments for the diagnosis of ocular pathologies.
- Acquire basic skills to handle specialized instruments.
- To know how to interpret the results of the measurements taken.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Being able to decide which instrument is more adequate for the measurement of a particular parameter.

Knowing the basis and limitations of the advanced optical instruments for inspection of eye fundus and ocular media.

Being able to instruct the patients adequately about how to perform a particular psychophysical test.

Being aware of the problems that encounter patients with specific characteristics –aged subjects, children, patients with cognitive problems – and being able to apply the necessary strategies to make diagnostic tests easier for them.

Being able to conduct a psychophysical test under the adequate conditions.

Being aware of the limitations of each measurement technique used.

Knowing the possible factors that could distort a measurement, being able to control them and, when possible, correct their effects.

Being able to evaluate the reliability of a measurement obtained with a standard device.

Being able to interpret the results yielded by a set of basic diagnostic devices.

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.

7. Tests of color vision

8. Incremental threshold perimetry I: Fundamentals

9. Campimetry II: Analysis of results

10. Tests for evaluating contrast sensitivity with gratings

11. Tests for the assessment of contrast sensitivity with complex stimuli

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Tutorials	7,50	100
Laboratory practices	7,50	100
Development of individual work	22,50	0
Preparation of evaluation activities	10,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	16,00	0
Resolution of case studies	4,00	0
TOTAL	**112,50**	

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. 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 (O) and Psychophysical Methods (P) with the same weight in the final grade.

In the first call of the course, the evaluation will carry out taking into account the following evaluation elements, all on 10 points in each one of the parts:

[**Nb,1**] Written exam (theory and problems)

[**Nb,2**] Supervised student's work

[**Nb,3**] Laboratory work

Where subindex b indicates the block (O or P). The final grade for each of the blocks (**Nb**) is the weighted mean of these elements:

Nb = 0.5Nb,1 + 0.3Nb,2 + 0.2Nb,3

The final grade of the subject will be ***NT*** = *0*.5***N***O+0.5***N***P. To pass the course it is necessary to obtain an overall score of at least ***NT = 5.0***.

To average between the different parts of the subject, the qualification in each element must be equal or greater than 3 out fo 10. Grades lower than 3 in any of the three parts of the two blocks implies failing the first call, even when NT is 5.0 or greater.

Grades N*b,*1, N*b,*2 i N*b,*3, can be maintained at the second call, but only if they are higher than 5.0. In this call, only the written examination of theory and laboratory with grades lower than 5.0 in each block will be repeated. From the scoresof these exams (***N*b,1*** and ***N*b,3***) two alternative marks are calculated:

- A first grade, ***N*b=0.5N*b,1*** **+ 0.3*Nb,2* + 0.2*N*b,3***, which takes into account the results of the continuous evaluation. In this case, the total grade of the subject is ***N*1T=0.5N*O+0.5 N*M***
- The second grade, ***N**b*** **= 0.8*N*b,1* + 0.2*N*b,3***, only takes this exam and the lab grade into account. In this case the total grade of the subject will be:
  N*2T= 0.5 N**O+ 0.5 N**M

These grades can only be computed if each exam obtains more than 3 over 10 points. A grade of less than 3 does not allow the subject to be passed.

The final grade of the second call (***NT****) is the maximum of ***N*1T*** and ***N*2T***.

As in the first call, to pass the course it is necessary to obtain a score of at least ***N*T* = 5.0**.

Grades Nb,1, Nb,2 i Nb,3 of each of the parts of the blocks will only be saved between successive calls within the same academic year.

REFERENCES

Basic

- Referencia b1: M.Corbett ,D. O'Brart, E. Rosen, R. Stevenson, Corneal Topography: Principles and Applications, , BMJ Books; (1999)
  Referencia b2: J.W. Goodman, Introduction to Fourier Optics (McGraw-Hill, 1996).

  Referencia b3: Schwartz J. S., Visual perception : a clinical orientation, MacGraw-Hill, 1999.
  Referencia b4: Norton T. T., Corliss D. A., Bailey J. E. Fundamentals of Visual Psychophysics, Elsevier, 2000.
  Referencia b5: Assembly of Behavioral and Social Sciences, National Research Council. Procedures for Testing Color Vision. Report of Working Group 41. Academy Press, 1981.
  Referencia b6: Birch, J. Diagnosis of Defective Colour Vision, Butterworth-Heineman, 2001.
  Referencia b7: Shapley R. y Man-Kit Lam D., eds., Contrast Sensitivity, The MIT Press, 1993.
  Referencia b8: Anderson R. y Patella V.M., Automated Static Perimetry, Mosby, 1999
  Referencia b9: Rowe F., Visual Fields Via The Visual Pathway, Blackwells, 2006.
  Referencia b10: CronlyDillon J. R. (Ed.) Vision and Visual Dysfunction, MacMillan Press, 1991.
- 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

Additional

- Referencia c1: Artículos seleccionados de distintas revistas especializadas: Vision Research, Opthalmic and Physiological Optics, Optometry and Vision Science, Investigative Ophthalmology and Vision Science, etc