COURSE DATA

DATA SUBJECT

Code: 34317
Name: Vision of forms and colour
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	Visual perception: mechanisms and clinical applications	ELECTIVES

COORDINATION

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SUMMARY

The phenomenon of vision is presented as a process of extracting information from the measurements acquired by an imaging system. In the case of the human visual system, the retinal images. The goal of this process is to represent the information in such a way that it can solve object identification problems. In this process, the sensors (neurons of the LGN and V1) are applied to the input signal and extract features whose behavior determines what information is retained and which one is removed. In this context, the role of characteristics such as edges, textures and colors is essential.The course consists of two major blocks: (1) texture vision, and (2) color vision. The course introduces the necessary material for the linear characterization of edge and texture sensors in V1. Its nonlinear behavior, related to adaptation to contrast, is also presented. About color, the limitations of the linear triestimulus colorimetry are presented (introduced in the subject "Vision Mechanisms and Models"), giving way to the consideration of the perceptual dimensions of chromatic stimuli and the nonlinear behavior of models that explain the appearance of color. At the end of the course students learn the basics of a simple spatichromatic observer model that can be applied to real images.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

There is no official restriction to select this course, but it is convenient to have attended "Psychophysics" (2nd year) and "Vision Mechanisms and Models" (3rd year).

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 how the visual system adapts to the frequency content (space-time) of complex scenes.

To know how the visual system adapts to the lighting level and the chromaticity of light.

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 architecture and function of the areas of the extra-striated cortex with relevant participation in visual perception, as well as their interactions.

To know the way in which the information of the various perceptual dimensions is integrated to make judgments about the scene.

DESCRIPTION OF CONTENTS

Brightness perception
Contrast discrimination
Perceptual contrast

1. First part

Brightness perception
Contrast discriminationMultichannel models
On the physiological mechanisms for spatial vision

2. Second part

Colour appearance. Limitations of the triestimulus colorimetry.
Colour visión models with a single opponent stage
Colour visión models with two opponent stages
On the physiological mechanisms for colour vision
Spatio-chromatic models

WORKLOAD

PRESENCIAL ACTIVITIES

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

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	35,00
Preparation of lessons	22,50
Preparation for assessment activities	0,00
Resolution of case studies	10,00
Total hours	**67,50**

TEACHING METHODOLOGY

1 Face-to-face work consisting of:

a) Theory classes, which will consist of the presentation and basic explanation of the corresponding material.

b) Seminars and demonstrative practices designed to illustrate the operation of the models covered in the course using specific software developed for the subject.

2) Non-contact work consisting of:

a) Completion (voluntary, see evaluation section) of exercises proposed in theory classes and seminars, as well as in practical classes.

b) Exam preparation.

3) Individual and / or group tutorials. There are established certain hours of unsched

EVALUATION

The first-evaluation can be carried out according to one of these two options:

OPTION 1: Assessment based on the completion of the proposed practical exercises and an additional (voluntary) examination of theoretical and practical questions to raise the grade. Therefore, in this option 1, the grade consists of two parts:

A.- For the delivery of the practical exercises proposed in both the theoretical and practical sessions (69% of the final mark).

B.- For the voluntary examination of theoretical-practical questions (31% of the final grade).

TThe mandatory compliance conditions to be evaluated for this modality are:

1.-Attendance at practical sessions (seminars and laboratory).

2.-Achieve a minimum grade of 5 in the exercises presented.

OPTION 2: For students who choose not to regularly attend practical sessions or do not submit exercises, an assessment based exclusively on the theoretical and practical exam will be proposed (which will count for 100% of the final grade).

The same rules will apply for the second call as for the first call.It will be possible to opt for option A if the practical sessions have been attended, handing in the exercises that were not handed in at the time or had not passed the cut-off mark. Otherwise, option B will be assessed.

REFERENCES

- Class notes and notes provided by the instructor (available on the virtual learning platform)
- B. Wandell. Foundations of Vision. Sinauer Assoc. 1995
- M. Fairchild. Color appearance models. Wiley. 2005
- P. Capilla et al. Introducción a la Colorimetria. Univ. Valencia 2002
- P. Capilla. Percepción visual. Psicofísica, mecanismos y modelos, Editorial Médica panamericana. 2019
- Gaskill. Linear Systems, Fourier Transforms, and Optics (Wiley Series in Pure and Applied Optics). Wiley 1978