



## COURSE MODULE – HUMAN PERCEPTION & COGNITION

COURSE CODE	COSI HPC
COURSE LEVEL	Master
ECTS CREDITS	5
COURSE INSTRUCTOR/S	Juan Luis Nieves & Luis Gómez Robledo (University of Granada)
EDUCATION PERIOD	SEMESTER 2
EXPECTED PRIOR-KNOWLEDGE	Modules Photonics and Optics Fundamentals" (1st semester) and Radiometry, Sources and Detectors" (2nd semester)
LANGUAGE OF INSTRUCTION	English

**AIM** The aim of the course is to provide a solid and integrated view of the visual processes with an emphasis on the physical aspects of visual information. This more quantitative approach is complemented with notions of retinal and cortical organization and with the fundamentals on visual psychophysics. Although the course aims at a solid theoretical basis, practical issues and problem solving will be considered wherever appropriate and independent project development and research will be strongly encouraged.

<b>COURSE OUTLINE</b>	<i>(topic 1)</i>	Introduction to visual perception. Visual perception and the main components of the human visual system. The visual process.
	<i>(topic 2)</i>	Visual Optics. Optics of the eye, spherical and astigmatic ametropies, ocular aberrations
	<i>(topic 3)</i>	Colour perception. Fundamentals of colour perception. Hue cancellation and opponent colours. Colour constancy. Acquired and inherited colour vision deficiencies.
	<i>(topic 4)</i>	Perceiving objects. Spatial aspects of visual perception. Perception of objects and shapes.
	<i>(topic 5)</i>	Visual attention and saliency. What determines where we look? Effects of Attention on visual Perception.
	<i>(topic 6)</i>	Perceiving depth and size. Cues to depth perception. Binocular vision and depth perception. Stereo acuity. Eye movements.
	<i>(topic 7)</i>	Motion perception. Optic flow. Perception and action.
	<i>(topic 8)</i>	Natural image statistics.

**PRACTICAL ACTIVITIES**

- Psychophysical methods.
- Visual optics simulations.
- Measurement of the Contrast sensitivity function
- Measurement of the Stereoacuity

*Specialized seminars* (University of Granada):

- Sérgio Nascimento: Chromatic diversity perceived by the normal and colour deficient observer.
- Rafael Navarro: From early stages of vision to Neural image coding & analysis and different applications

**LEARNING OUTCOMES<sup>1</sup>**

On completion of this course the students will be able to:

- anatomically and functionally identify the main components of the human visual system.
- apply visual optical to describe the imaging process in the eye.
- develop a basic working knowledge of classical psychophysics.
- develop an understanding of the relation between biological systems, neural processing mechanisms, and perception. This will include understanding the how biological factors influence aspects of human visual.
- develop an understanding of the study of sensory systems and processes within the historical context of the field, and potential future directions of the field. This includes understanding the tentative nature of knowledge, tolerating ambiguity, and using skeptical inquiry to discover discrepancies and/or gaps in current knowledge.

<sup>1</sup> The meaning of *keywords* in italic used to define Learning Outcomes are detailed in Annex.



- develop and refine their ability to critically read and understand scientific literature, understand and use scientific and technical vocabulary, and synthesize information from multiple sources.

FORM/S OF ASSESSMENT Written exam (60%), Practical work (40%)

ASSESSMENT CRITERION Written exam lab sessions and Homework/seminar presentations

Excellent - outstanding performance	A
Very Good - above the average standard but with some errors	B
Good - generally sound work with a number of notable errors	C
Satisfactory - fair but with significant shortcomings	D
Sufficient - performance meets the minimum criteria	E
Fail - some more work required before the credit can be awarded	FX
Fail - considerable further work is required	F

Detail of criteria used to assess acquired skills :

- Activities and questionnaires giving evidence of knowing (5%)
- Activities and questionnaires giving evidence of comprehension/understanding (5%)
- Activities and questionnaires giving evidence of analysis (5%)
- Activities and questionnaires giving evidence of synthesis (5%)
- Activities and questionnaires giving evidence of evaluation (5%)

The evaluation of informal learning outcomes will be based on questionnaires and laboratory notebook (self-evaluation, learning diary).

LITERATURE AND STUDY MATERIALS

*Basic textbook:*

- Sensation and Perception. E. Bruce Goldstein. 6th edition Wadsworth Publishing. ISBN: 0534639917, 2002
- Foundations of vision, Brian A. Wandell, Sinauer Associates, 1995.
- Introduction to Visual Optics. Alan H. Tunnacliffe. Association of British Dispensing Opticians. ISBN 0-900099-28-1, 1993.

*Additional books:*

- Vision science: photons to phenomenology, Stephen E. Palmer, The MIT Press, 1999.
- Eye, brain, and vision, David A. Hubel, W. H. Freeman & Co, 1988.

CONTACT DETAILS

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