Guía docente
32089 - VO - Óptica Visual

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Unidad responsable: Escuela Técnica Superior de Ingeniería de Telecomunicación de Barcelona
Unidad que imparte: 731 - OO - Departamento de Óptica y Optometría.

Titulación: DOCTORADO EN FOTÓNICA (Plan 2007). (Asignatura optativa).
MÁSTER UNIVERSITARIO EN FOTÓNICA (Plan 2009). (Asignatura optativa).
MÁSTER UNIVERSITARIO ERASMUS MUNDUS EN INGENIERÍA FOTÓNICA, NANOFOTÓNICA Y BIOFOTÓNICA (Plan 2010). (Asignatura optativa).

Curso: 2015 **Créditos ECTS:** 2.5 **Idiomas:** Inglés

PROFESORADO

Profesorado responsable: Montserrat Arjona

Otros: Jaume Pujol

METODOLOGÍAS DOCENTES

Presencial Teaching + activities

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

Visual optics deal with the issues of how light propagates and forms images into the eye. Visual Optics have suffered a remarkable expansion in the last years due basically to the development of new sensors and techniques that rapidly provide accurate and complete descriptions of the eye¿s aberrations, and the demonstration that adaptive optics can provide better correction of the eye¿s aberrations than has previously been possible.
The course focuses on the basic and advanced topics covered by Visual Optics. It assumes a basic knowledge of optics (aberration theory) and Fourier Optics; many of the key background concepts are reviewed. Basic models for the optics of the eye are presented. In this context, refractive anomalies and accommodation are studied including the most important optical features of any type of correcting lenses ophthalmic, contact or intraocular. Visual performance, including Visual Acuity and Contrast Sensitivity measurements is also described. The most important part of the course is devoted to the study of the optical quality of the eye. Topics covered include aberrations, their measurement and correction using adaptive optics systems, retinal image quality and intraocular scatter measurement. Finally, the latest techniques to obtain high resolution retinal images are analyzed. Numerous examples and applications are described.

CONTENIDOS

Refractive anomalies. Spherical refractive anomalies Astigmatic refractive errors. The aphakic eye Intraocular Lenses. Power Calculations. Applications: simulation.

The human eye: an overview. Structure of the eye. Refracting components. Schematic eye models.. Visual performance. Visual Acuity and Contrast Sensitivity. Applications: simulation.

. Accommodation. Amplitude of accommodation. Presbyopia. Progressive lenses. Multifocal contact and intraocular lenses. Applications: simulation

Human eye aberrations and measurement techniques. Monochromatic and Chromatic oculer aberrations. Evaluation ocular aberrations. Wavefront sensors for the eye. Hartmann¬Shack Wavefront sensor. Laser Ray tracing. Applications: measurement of ocular aberrations.

Retinal image quality measurement. Double pass technique. Intraocular scatter measurements. Applications: measurement of ocular optical quality.

Adaptive optics for vision. Principal components of an AO system. Wavefront correctors. Applications

High ¬Resolution Retinal Imaging. Conventional imaging. Scanning Laser Imaging. OCT Ophthalmoscope

Future trends and applications

SISTEMA DE CALIFICACIÓN

Exam
Homework (problems, selected papers reading, short presentation¿.)

NORMAS PARA LA REALIZACIÓN DE LAS PRUEBAS.

The usual in University teaching

BIBLIOGRAFÍA

Básica:
- Atchison, D.A.; Smith, G. Optics of the human eye. Oxford [etc.]: Butterworth Heinemann, 2000. ISBN 0750637757.
- Porter, J. [et al.]. Adaptive optics for vision science: principles, practices, design and applications. Canadà: Wiley-Interscience, 2006. ISBN 9780471679417.
- Rabbetts, R.B. Clinical visual optics. 4th ed. Edinburgh [etc.]: Elsevier/Butterworth Heinemann, 2007. ISBN 9780750688741.
- Viqueira Pérez, V.; Martínez Verdú, F.M.; De Fez Saiz, D. Óptica fisiológica: modelo paraxial y compensación óptica del ojo. San Vicente del Raspeig: Universidad de Alicante, 2003. ISBN 8479087757.

Complementaria:
- Artigas, J.M. [et al.]. Óptica fisiológica: psicofísica de la visión. Madrid: McGraw-Hill Interamericana, 1995. ISBN 8448601157.
- De Valois, K.K. Seeing. San Diego [Calif.] [etc.]: Academic Press, 2000. ISBN 0124437605.
- Keating, M.P. Geometric, physical and visual optics. 2nd ed. Boston [etc.]: Butterworth-Heinemann, 2002. ISBN 9780750672627.
- Schwartz, S.H. Geometrical and visual optics: a clinical introduction. New York: McGraw-Hill, 2002. ISBN 0071374159.
- Cronly-Dillon, J.R. (ed.). Vision and visual dysfunction: visual optics and instrumentation (vol. 1). Houndmills, Basingstoke, Hampshire: Macmillan Press, 1991. ISBN 9780333452240 (V.1).