GUIA DOCENTE DE LA ASIGNATURA

Fundamentals of Spectral Science

Curso 2016-2017

(Fecha última actualización: 11/07/16)

MÓDULO	MATERIA	CURSO	SEMESTRE	CRÉDITOS	TIPO
	Fundamentals of Spectral Science		2º	5	Obligatorio

PROFESORES*	DIRECCIÓN COMPLETA DE CONTACTO PARA TUTORÍAS (Dirección postal, teléfono, correo electrónico, etc.)
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	HORARIO DE TUTORÍAS*

MASTER EN EL QUE SE IMPARTE
Máster E+ Color in Science and Industry COSI

PRERREQUISITOS Y/O RECOMENDACIONES (si procede)

- Module “Fundamentals” (1st semester)

BREVE DESCRIPCIÓN DE CONTENIDOS (SEGÚN MEMORIA DE VERIFICACIÓN DEL GRADO)

The main aim of this course is to provide the basis of the multispectral approach of color imaging, i.e., imaging systems that use more than three acquisition channels. The contents include image capture procedures, spectral characterization of image capture devices, estimation of spectral functions from conventional image capture systems, evaluation of the accuracy or performance of multispectral images, and a basic description of some of the most relevant applications of multispectral images.

COMPETENCIAS GENERALES Y ESPECÍFICAS

On completion of this course the students will be able to:
• Demonstrate an understanding of basic multispectral color science.

* Consulte posible actualización en Acceso Identificado > Aplicaciones > Ordenación Docente.

• Analyze, compare, develop and implement algorithms for spectral estimation from camera responses.
• Describe, analyze and reason about how multispectral acquisition devices work and how can they be optimized for a particular application.
• To know the state of the art of spectral color science and some of its most relevant fields of application.

OBJETIVOS (EXPRESADOS COMO RESULTADOS ESPERABLES DE LA ENSEÑANZA)

TEMARIO DETALLADO DE LA ASIGNATURA

Topics to be taught (may be modified):

- Overview of color imaging: light and surfaces, color vision, colorimetry, physics of image capture.
  Spectral measurements: theory and instruments.
- Spectral characterization of image acquisition systems: experimental determination of spectral response curves, influence of noise.
- Mathematical modelization of spectral functions: reflectances, illumination, color signals, etc. Linear and non-lineal models: principal and independent component analysis.
- Spectral estimation from camera responses: models, algorithms, a priori necessary information, selection of data sets, use of color filters, filter selection, quality evaluation of the spectral signals obtained, influence of noise.
- Spectral accuracy performance: theoretical and experimental evaluation.
- Experimental spectral image acquisition systems.
- Applications of spectral imaging.

Practical Laboratory Sessions:
Matlab laboratory topics in order to implement and master basic issues explained in the lectures.

BIBLIOGRAFÍA

Basic textbook:
Acquisition and Reproduction of color images: colorimetric and multispectral approaches. J.Y. Hardeberg, 2001 (Universal Publishers)?

Additional books:

Color image science: Exploiting Digital Media. MacDonald, Luo, 2002 (John Wiley and Sons) http://books.google.es/books?id=IbexPr9lcjoC&dq=Multispectral+images+book&lr=&source=gbs_summary_s&cad=0

Spectral Imaging: Eighth International Symposium on Multispectral Color Science. Mitchell Rosen, Francisco H. Imai, Shoji Tominaga, 2006, SPIE. Este sería para algunas aplicaciones…

Remote sensing digital image analysis: an introduction. Richards, Xia,, 2006 (Springer). http://books.google.es/books?id=4PB5vhPBdJ4C&dq=remote+sensing+digital+image+analysis+an+introduction&pg=PP1&ots=AdMv5QdNUS&sig=UsezCWV1efMkDU4MWuKUFrtIYUc&hl=es&prev=http://www.google.es/search?hl=es&q=Remote+Sensing+Digital+Image+Analysis:+An+Introduction&btnG=Buscar+con+Google&sa=X&oi=print&ct=title&cad=one-book-with-thumbnail

ENLACES RECOMENDADOS

METODOLOGÍA DOCENTE

Teaching methods: Lectures and lab classes, and homework exercises.

EVALUACIÓN (INSTRUMENTOS DE EVALUACIÓN, CRITERIOS DE EVALUACIÓN Y PORCENTAJE SOBRE LA CALIFICACIÓN FINAL, ETC.)

Written exam (60%), Practical work (40%)

INFORMACIÓN ADICIONAL