# Image Acquisition and Reproduction

Curso 2016-2017
*(Fecha última actualización: 11/07/16)*

| MÓDULO | MATERIA | CURSO | SEMESTRE | CRÉDITOS | TIPO |
|---|---|---|---|---|---|
| | Image acquisition and reproduction | | 2º | 5 | Optional |

| PROFESORES* | DIRECCIÓN COMPLETA DE CONTACTO PARA TUTORÍAS (Dirección postal, teléfono, correo electrónico, etc.) |
|---|---|
| Javier Romero, Luis Gomez Robledo, Eva Valero (University of Granada) | http://directorio.ugr.es/static/Personal/*/jromero_at_ugr.es |
| | **HORARIO DE TUTORÍAS*** |
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**MASTER EN EL QUE SE IMPARTE**

Máster E+ Color in Science and Industry COSI

**PRERREQUISITOS Y/O RECOMENDACIONES (si procede)**

Modules Photonics and Optics Fundamentals" (1st semester) and Radiometry, Sources and Detectors" (2nd semester)

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

This course will aim to provide the student with accurate knowledge about working principles and internal processing mechanisms of color image capture devices (mainly RGB cameras and RGB scanners) and also color reproduction devices, from a more technical perspective than offered in previous courses of the master, and dealing with more complete theoretical and practical issues.

**COMPETENCIAS GENERALES Y ESPECÍFICAS**

**OBJETIVOS (EXPRESADOS COMO RESULTADOS ESPERABLES DE LA ENSEÑANZA)**

Knowledge and Comprehension of the fundamentals, principles, applications, limits, relationships, of all concepts and topics covered by this course;
Application, Analysis, Synthesis and Evaluation skills of the main concepts and topics covered by this course;

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

Ability to apply/implement concepts and principles introduced in the lectures on practical tasks and on industrial study cases;
Ability to self-learn, to understand some problems and to suggest/find solutions to solve these problems.

## TEMARIO DETALLADO DE LA ASIGNATURA

### Topics to be taught (may be modified):

Introduction and review of basic concepts.
Optical image formation.
Quality of imaging systems.
RGB cameras and scanners.
Display technologies.
Printing technologies.
Color management.

### Practical Laboratory Sessions:

- Basic characterization of a RPi webcam: measurements of dark current signal and linearity testing. Computing the Camera Response Function.
- Analysis of the optimal camera settings for a vegetation detection application using conventional digital cameras.
- Scanning and photographing the Macbeth color checker. Evaluation of the color fidelity (assessed by displaying the two images in the same LCD-based calibrated display, measuring the color signals of the 24 patches with a spectroradiometer and computing the color differences between them; comparing both with the reference of the checker placed side by side). Analysis of the image quality provided by the two color acquisition devices using the standard metrics. Discussion of results.
- Printing the Macbeth color checker. Using two different impact printing technologies with standard settings. Comparative with the previous results using color image capturing devices coupled to a display.

## BIBLIOGRAFÍA

Color Imaging. E. Reinhard et al. AK Peters, 2008.
Introduction to color imaging science. Hsien-Che Lee. Cambridge, 2005.

Tutorials, lectures and notes provided by the course instructor

Additional books:

The Science of Imaging. An introduction. G. Saxby. IoP, 2002.
The reproduction of color. R.W.G. Hunt. Wiley, 2005.

## ENLACES RECOMENDADOS

## METODOLOGÍA DOCENTE

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

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| **EVALUACIÓN (INSTRUMENTOS DE EVALUACIÓN, CRITERIOS DE EVALUACIÓN Y PORCENTAJE SOBRE LA CALIFICACIÓN FINAL, ETC.)** |
| 30% continuous evaluation of theoretical contents; 70% practical work (20% lab work including reports + 50% homework including proposed exercises and a seminar about a recently developed technology for color image acquisition or reproduction devices). |
| **INFORMACIÓN ADICIONAL** |
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