

| MÓDULO                                                                                                                                                                                                                                                                                                | MATERIA                           | CURSO | SEMESTRE                                                                                                                                                                                                                                                                                   | CRÉDITOS | TIPO     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|
|                                                                                                                                                                                                                                                                                                       | Radiometry, Sources and Detectors |       | 2º                                                                                                                                                                                                                                                                                         | 5        | Optativa |
| PROFESORES*                                                                                                                                                                                                                                                                                           |                                   |       | DIRECCIÓN COMPLETA DE CONTACTO PARA TUTORÍAS<br>(Dirección postal, teléfono, correo electrónico, etc.)                                                                                                                                                                                     |          |          |
| Antonio Pozo<br>Ana Carrasco Sanz (University of Granada)                                                                                                                                                                                                                                             |                                   |       | <a href="http://directorio.ugr.es/static/Personal/*/amp_molin_at_ugr.es">http://directorio.ugr.es/static/Personal/*/amp_molin_at_ugr.es</a><br><a href="http://directorio.ugr.es/static/Personal/*/acarrasco_at_ugr.es">http://directorio.ugr.es/static/Personal/*/acarrasco_at_ugr.es</a> |          |          |
|                                                                                                                                                                                                                                                                                                       |                                   |       | HORARIO DE TUTORÍAS*                                                                                                                                                                                                                                                                       |          |          |
|                                                                                                                                                                                                                                                                                                       |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| MASTER EN EL QUE SE IMPARTE                                                                                                                                                                                                                                                                           |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| Máster EM Color in Informatics and Media Technology<br>CIMET                                                                                                                                                                                                                                          |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| PRERREQUISITOS Y/O RECOMENDACIONES (si procede)                                                                                                                                                                                                                                                       |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| Module “Photonics and Optics Fundamentals” (1 <sup>st</sup> semester)                                                                                                                                                                                                                                 |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| BREVE DESCRIPCIÓN DE CONTENIDOS (SEGÚN MEMORIA DE VERIFICACIÓN DEL GRADO)                                                                                                                                                                                                                             |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| This course develops an understanding of the measurement of electromagnetic radiation in spectral regions from ultraviolet to infrared. The course covers principles of radiometric, photometric and spectrophotometric instrumentation, including the study of light sources and physical detectors. |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| COMPETENCIAS GENERALES Y ESPECÍFICAS                                                                                                                                                                                                                                                                  |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| On completion of this course the student will be able to:                                                                                                                                                                                                                                             |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |
| • Understand (i.e. to describe, analyse and reason about) how to use the methodology in                                                                                                                                                                                                               |                                   |       |                                                                                                                                                                                                                                                                                            |          |          |

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



quantifying electromagnetic radiation, from ultraviolet to infrared.

- Correctly use radiometric and photometric quantities and units.
- Understand (i.e. to describe, analyse and reason about) how to characterize light sources with different emission spectra.
- Understand (i.e. to describe, analyse and reason about) how to characterize photodetectors with different properties and responsivities.
- Demonstrate the use of mathematical tools to solve problems in radiometry and photometry.

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

#### TEMARIO DETALLADO DE LA ASIGNATURA

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

- Fundamentals of radiometry: Radiometric quantities and important laws.
- Photometric quantities: Photometry versus radiometry, radiometric and photometric quantities.
- Sources: Thermal sources (blackbody and incandescent lamps), gas discharge, luminescent, laser, solid state (light emitting diodes).
- Secondary light sources. Transmission, reflection, absorption.
- Photodetectors: Important features and types (thermal, photoemissive, photoconductive and photovoltaic detectors).
- Electronics reviews: detector electronics, detector interfacing.
- Noise in detection. Performance limits.
- Matrix detectors.
- Design and calibration of a radiometric system. Measurement uncertainty.
- Radiometric, spectroradiometric and photometric instruments.
- Radiometric measurements of satellite observation and remote sensing.
- Radiometry of laser and coherent sources.

##### Practical Laboratory Sessions:

- Verification of photometry laws.
- Design and built a radiance meter.
- Photodetector calibration.
- Source calibration.

#### BIBLIOGRAFÍA

**Literature and study materials:** Handouts of the material covered in the lectures will be distributed.

##### Reference book:

Wolf, W. L., "Introduction to Radiometry", Ed. By SPIE-The International Society for Optical Engineering (Bellingham, 1998).



Additional books:

Grum F. and Becherer J., "Radiometry", vol. 1 of "Optical Radiation Measurements", Ed. By Academic Press, 1979.

Boyd R. W., "Radiometry and the detection of optical radiation", Ed. By John Wiley & Sons, 1983.

Parr A. C., Datla R. U. and Gardner J. L., editors, "Optical Radiometry", Elsevier Academic Press, 2005.

**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.)**

60% for the exam(s) versus 40% for practical (seminar, exercises, project...)

**INFORMACIÓN ADICIONAL**



*ugr*

Universidad  
de Granada