

## 230572 - MANAGL - Managing Light with Devices

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering  
Teaching unit: 731 - OO - Department of Optics and Optometry  
Academic year: 2015  
Degree: MASTER'S DEGREE IN PHOTONICS (Syllabus 2013). (Teaching unit Optional)  
ECTS credits: 3 Teaching languages: English

### Teaching staff

Coordinator: María S.Millán, UPC.  
Others: Elisabet Pérez-Cabré, UPC.

### Opening hours

Timetable: millan@oo.upc.edu  
elisabet.perez@upc.edu

### Degree competences to which the subject contributes

Transversal:

1. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
2. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding how companies are organised and the principles that govern their activity, and being able to understand employment regulations and the relationships between planning, industrial and commercial strategies, quality and profit.
3. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
4. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
5. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

### Teaching methodology

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### Learning objectives of the subject

This course aims to provide the students with fundamental and practical knowledge of the devices that can be used to generate (light sources), modulate (illumination systems, optical modulators, adaptive optical devices and displays) and detect optical signals (sensors and cameras), focusing on their most relevant applications to the industrial and research environments. The fundamentals of radiometry, photometry and colourimetry are reviewed. Useful tips to choose the most appropriate device to a given application will be provided. Some specific applications in machine vision are described. Lasers are not included as they are considered in other courses. Basics of optics (such as geometrical and electromagnetic optical models, and polarization), which are considered in the courses Introduction to Photonics

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and Beam Propagation, are assumed to be part of the background knowledge of the student.

### BIBLIOGRAPHY

- J.M Liu, Photonic devices, Cambridge Univ. Press, 2005
- B. E. A. Saleh, M. C. Teich, Fundamentals of Photonics, Wiley Series in Pure and Applied Optics 1991
- G.C. Holst, CCD arrays, cameras, and displays, 2nd ed. SPIE Press JCD Publishing, 1998
- V. G. Chigrinov, Liquid crystal devices, Artech House, 1999
- R.K.Tyson "Introduction to adaptive optics" SPIE 2000 Tutorial TT41.
- J.Porter et al "Adaptive optics for vision science" Wiley Interscience 2006

Updated specific bibliography may be given in several of the topics at the ATENEA webpage.

### Study load

Total learning time: 75h	Theory classes:	22h 30m	30.00%
	Practical classes:	0h	0.00%
	Laboratory classes:	0h	0.00%
	Guided study:	2h 15m	3.00%
	Self study:	50h 15m	67.00%

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### Content

1. Characterizing light: Radiometry, photometry

Degree competences to which the content contributes:

2. Light Sources

Degree competences to which the content contributes:

3. Optical modulation (I) based on the acoustooptic effect

Degree competences to which the content contributes:

4. Optical modulation (II) based on the electrooptic effect.

Degree competences to which the content contributes:

5. Optical modulation(II) and displays.

Degree competences to which the content contributes:

6. Optical sensors and cameras.

Degree competences to which the content contributes:

7. Machine vision applications.

Degree competences to which the content contributes:

### Qualification system

-Homework + exam (¿70%).

- Attending seminars and visits, lab practical task, class attendance and participation (¿30%).

### Bibliography