Last update: 13-05-2015

230567 - INTEGR - Integrated Photonics

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering

Teaching unit: 1004 - UB - (ENG)Universitat de Barcelona

Academic year: 2015

Degree: MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
MASTER'S DEGREE IN PHOTONICS (Syllabus 2013). (Teaching unit Optional)
ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND BIOPHOTONICS (Syllabus 2010). (Teaching unit Optional)
MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2013). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Sergi Hernández, UB (coord.).

Others: Mauricio Moreno, UB.

Opening hours

Timetable: shernandez@el.ub.edu
mmoreno@el.ub.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. 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

A BRIEF DESCRIPTION

The objective of this course is to give in depth knowledge of devices that are basic components of integrated-photonic integrated-systems, including optical couplers, micro-ring resonators or nonlinear photonic devices. The fabrication

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processes, technology steps and designing tools will be described in detail. Emphasis in state of the art materials (Si or III-V compounds) will be made in the descriptions of photonics devices.

BIBLIOGRAPHY:
- Fundamentals of Photonics. Salech ¿ Teich. Wiley Series in Pure and Applied Optics.
- Integrated Photonics: Fundamentals, Ginés Lifante, John Wiley & Sons Ltd. (England) 2003.
- Elements of Photonics, Keigo Iizuka, John Wiley & Sons, Inc. (New York) 2002.
- Fundamentals of Optoelectronics, Clifford R. Pollock, McGraw-Hill, (New York) 1994.
- Integrated optics. Ed. T.Tamir. Springer-Verlag. Topics in Applied Physics.
- Microoptics: Elements, systems and applications. Hans Peter Herzig.
- MOEMS. Micro-Opto-Electro-Mechanical Systems. Ed. Motamedi. SPIE Press.

Study load

Total learning time: 75h	Hours large group:	22h 30m	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	2h 15m	3.00%
	Self study:	50h 15m	67.00%

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Content

1.- Introduction

Degree competences to which the content contributes:

2.- Passive integrated photonic components

Degree competences to which the content contributes:

Description:

2.1.- Waveguides (rib, strip-loaded, slot¿).
2.2.- Optical couplers.
2.3.- Add/drop micro-rings.
2.4.- Tapers, MMIs, MZI.
2.5.- Prism coupling and Periodic Coupling. Gratings for biosensing.

3.- Active integrated photonic components

Degree competences to which the content contributes:

Description:

3.1.- Light sources: lasers and LEDs.
3.2.- Optical amplifiers: waveguides and SOA.
3.3.- Detectors for visible and infrared ranges.
3.4.- Modulators: Electro-optic and acusto-optics devices.

4.- Integrated micro and nanophotonics technology

Degree competences to which the content contributes:

Description:

4.1.- Technological platforms for photonic integrated circuits (PIC).
4.2.- Basic technology steps (deposition, lithography, etching). Polymer technologies.
4.3.- Optoelectronic hybrid integration.
4.4.- Microlens and MOEMS for Optical Communications.
4.5.- Simulation tools for designing photonic integrated systems.

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Qualification system

- Exam: written (60%)
- Simulation work based on OptiFDTD (20%)
- Oral presentation regarding simulation work (20%)

Bibliography