Course guide
230568 - PHSTELE - Photonics Systems in Telecommunications

Last modified: 14/12/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.

Degree: **Academic year:** 2019 **ECTS Credits:** 3.0
Languages: English

LECTURER

Coordinating lecturer: María Santos (UPC)

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE2. Demonstrate the understanding of the peculiarities of the quantum model for light-matter interaction.
CE4. Demonstrate knowledge of the fundamentals of image formation, propagation of light through different media and Fourier Optics.
CE9. Ability to synthesize and present photonics research results according to the procedures and conventions of scientific presentations in English.

Generical:
CG1. Ability to project, design and implement products, processes, services and facilities in some areas of photonics, such as photonic engineering, nanophotonics, quantum optics, telecommunications and biophotonics.
CG2. Ability to modeling, calculate, simulate, develop and implement in research and technological centers and companies, particularly in research, development and innovation tasks in all areas related to Photonics.
CG4. Ability to understand the generalist and multidisciplinary nature of photonics, seeing its application, for example, to medicine, biology, energy, communications or industry

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.

Basic:
CB6. Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
CB7. Students should know how to apply the knowledge acquired and their problem-solving ability in new or little-known environments within broader (or multidisciplinary) contexts related to their area of ¿¿study.
CB8. Students should be able to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgment.
CB10. Students should possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.

TEACHING METHODOLOGY

- Lectures
- Activities

LEARNING OBJECTIVES OF THE SUBJECT

?Microwave Photonics? is a cross-disciplinary field of knowledge concerned with interactions between the ?optical? and the ?electrical? portions of the electromagnetic spectrum, with differentiated concepts and techniques. In this subject we will give an overview of the main techniques and devices involved in the field of Microwave Photonics from a practical perspective and with emphasis on applications. Some of the topics will be covered in a lecture format, whereas others will be subjects for in?class student presentations and subsequent discussion in a collegial seminar?style format.

STUDY LOAD

Type	Hours	Percentage
Self study	50,3	66.98
Guided activities	2,3	3.06
Hours large group	22,5	29.96

Total learning time: 75.1 h

CONTENTS

Issue 1

Description:
Microwave-Photonic Systems: concepts and devices

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

Issue 2

Description:
Radio-over-fiber systems

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

Issue 3

Description:
Microwave Photonic filtering techniques

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

Issue 4

Description:
Antenna optical beam forming and beam steering networks

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

Issue 5

Description:
Microwave Photonic measurement techniques

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

ACTIVITIES

Seminar

Full-or-part-time: 2h 18m
Theory classes: 2h 18m

GRADING SYSTEM

Passing grade depends on class participation, a written report on a guided research work (term-paper) and a final written exam (50%+50%).

BIBLIOGRAPHY

Basic:
- Iezekiel, S. Microwave photonics : devices and applications [on line]. Chichester: Wiley & Sons, 2009Available on: http://onlinelibrary.wiley.com/book/10.1002/9780470744857. ISBN 9780470744857.
- Lee, C.H.L. Microwave photonics [on line]. 2nd. ed. Boca Raton: CRC, 2013 [Consultation: 20/04/2020]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=1142020. ISBN 9781466502871.
- Cox, C.H. Analog optical links : theory and practice. New York: Cambridge University Press, 2004. ISBN 0521621631.