SUBJECT TEACHING GUIDE

1023 - Optoelectronics

University Master's Degree in the Science and Engineering of Light

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	University Master's Degree in the Science and Engineering of Light			Type and Year	Compulsory. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline					
Course unit title and code	1023 - Optoelectronics				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA
Name of lecturer	ANTONIO QUINTELA INCERA
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Office	
Other lecturers	MARIA ANGELES QUINTELA INCERA

3.1 LEARNING OUTCOMES
- Explain the fundamental physical and technical basis of optoelectronic systems
- Describe the basic laws and phenomena that define the behaviour of optoelectronic systems.
- Analyze various premises, procedural approaches, and results related to optoelectronic systems.
- Use optoelectronic equipment and instrumentation.
- Perform experiments and measurements in the laboratory and on real components and devices of optoelectronic systems.
- Describe the development and applications of optoelectronic systems.
- Interpret the data acquired.
- Participation in teamwork and being able to independently present professional teams

4. OBJECTIVES
Define the general concepts related to semiconductor materials and optoelectronic devices.
Operate basic optoelectronic characterisation instrumentation.
Fundamentals of semiconductor light detection
List the main types, structure of detectors and the most relevant differences between different photodiodes.
Fundamentals of semiconductor light emission
Describe the most relevant differences between light sources based on their technical characteristics.
Correctly interpret technical information related to optoelectronic devices and systems.
Study the concepts of electro-optic modulation as well as the different devices and systems.
Design, analyze, and in some cases assemble and verify optoelectronic circuits for different applications.

6. COURSE ORGANIZATION	
CONTENTS	
1	Introduction to the optical properties of semiconductors (absorption, emission, refractive index)
2	Photodetectors, types, structures, devices, and systems.
3	Light-emitting diodes (LEDs). Materials, operation, structures, and types.
4	Laser diodes, structures, materials, operation, characteristics, and types.
5	Electro-optic modulation, devices, and systems.
6	Optoelectronic circuits, systems, applications.
7	Tutoring
8	Final Project.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Evaluation through follow-up tests.	Others	No	Yes	55,00
Evaluation of laboratory practices.	Laboratory evaluation	No	Yes	15,00
Final Project	Work	No	Yes	30,00
TOTAL				100,00

Observations
Passing the subject will be achieved when at least 50% of the total grade is obtained by adding the results of all the mentioned assessments (i.e., 5 points out of 10). In the event of a new health alert due to COVID-19 that makes it impossible to conduct in-person evaluations, remote evaluation of assignments, practical laboratory exercises, and written tests is anticipated.
Observations for part-time students
The part-time enrolled student may choose either the evaluation method described above in this teaching guide or solely take the Final Exam in the regular or extraordinary session. In the latter case, the weight of this exam will be 100%.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
1. Optoelectronics and Photonics, Principles and Practices, S,O. Kasap, Pearson Education (2013).
2. Optoelectronics, Emmanuel Rosenchar and Borge Vinter. Cambridge University (2002).
3. Fundamentals of photonics, Bahaa E. A. Saleh, Malvin Carl Tech. Wiley -Interscience, 2 Edition (2007).
4. Optoelectronics: infrared-Visible, UV, Devices and Applications, Dave Birtalan, 2nd ed., CRC Press (2009).
5. Photonics: Optical Electronics In Modern Communications, Amnon Yariv, and Pochi Yeh, Oxford University Press, 6th Edition, (2007).
6. Physics of Photonic Devices, S. L. Chuang , 2nd ed. Wiley, (2009).