SUBJECT TEACHING GUIDE

G288 - Electronic and Photonic Devices

First Degree in Telecommunication Technologies Engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	First Degree in Telecommunication Technologies Engineering			Type and Year	Core. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Electronics Basic Training Module				
Course unit title and code	G288 - Electronic and Photonic Devices				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Knowledge Field	Electrical engineering, electronic engineering and telecommunications engineering				
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	ADOLFO COBO GARCIA
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Office	Edificio Ing. de Telecomunicación Prof. José Luis García García. Planta: - 3. DESPACHO PROFESORES (S324)
Other lecturers	OLGA MARIA CONDE PORTILLA FRANCISCO JAVIER MADRUGA SAAVEDRA MARIA ANGELES QUINTELA INCERA

4. OBJECTIVES
To appreciate the relevance of electronics and photonics in telecommunications and society in general . Understand the operating principles, analyze the behavior, and learn the details and construction varieties, functions, and applications of the most representative electronic and photonic devices. Identify, decode, and select the most appropriate devices for specific applications.
To apply basic knowledge of conduction and semiconductor physics to understand the behavior and limitations of devices . Know static and dynamic models to describe the behavior of devices. Analyze I-V curves of devices. Apply concepts of reliability and heat management.
To understand the concept of the operating point and design basic bias circuits for bipolar and unipolar transistors . Analyze the behavior of basic electronic circuits that include bipolar and unipolar transistors, in both static and small-signal regimes. Understand the issue of heat generation in devices and design appropriate mitigation strategies.
To design and build basic circuits with devices and measure their behavior in the laboratory using electronic instrumentation (oscilloscope, multimeter, function generator, power supply), comparing the measurements with the behavior predicted by the design. Develop strategies to approach the design or analysis of a circuit with electronic and photonic devices, as well as to detect and resolve faults in electronic circuits.
To work cooperatively to design circuits with electronic and photonic devices that enable a micro -robot to execute a pre-designed strategy, and defend it orally. Write structured technical reports using clear and precise technical language , with appropriate presentation and references.

6. SUBJECT PROGRAM	
CONTENTS	
1	Fundamentals: Electronics and photonics in telecommunications Analog and digital signals Current and voltage; power and energy in circuits Electrical supply and circuit power Kirchhoff's laws and superposition Static, transient, AC/DC behavior RLC circuits Thevenin and Norton equivalents Input and output impedance Dependent sources.
2	Electronic and Photonic Devices: Device parameters and standardization I-V curve of two and three terminal devices Static, dynamic, small signal, and large signal models Bias point, static and dynamic resistance Thermal behavior Reliability Basic models of: Passive devices Active devices Bipolar transistors Unipolar transistors Photonic and optoelectronic devices Other devices.
3	Semiconductors, PN Junction, and Diodes: Conduction in solids Semiconductor materials Intrinsic and extrinsic semiconductors PN junction Diodes Applications of diodes
4	Bipolar Junction Transistor (BJT): Configuration and operating regions Characteristic curves and biasing Static and small signal models Applications
5	Unipolar Transistors (JFET, MOSFET, MESFET): Configuration and operating regions Characteristic curves and biasing Static and small signal models CMOS circuits and logic gates Other applications
6	Photonic Devices: Optical fiber LED and laser diodes LDR, photodiodes, phototransistors Optocoupler Photovoltaic cell Applications

7	Cooperative activity (micro-robot)

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Unit tests (exams at the end of each unit 2 to 6). Exams for units 2 and 3&4 will be during the semester. Exam for units 5&6 will be at the ordinary call. The later have a re-assesment in the extraordinary call.	Others	No	Yes	70,00
Final exam. The evaluation includes an exam about units 2, 3&4, and 5&6, with a weight of 70%. This exam could substitute the grades of "unit tests (2, 3&4)", with the same total weight (45%).	Written exam	Yes	Yes	0,00
Experimental skills in the electronics lab. Grades are the sum of: measurement skills (individual experimental assesment), daily work at the lab, and a final cooperative activity (robot)	Laboratory evaluation	No	Yes	30,00
TOTAL				100,00

Observations

The final exam in the ordinary call can substitute the grades of the 'unit tests' of units 2 and 3&4, with the same 45% weight.
the 'unit test' of units 5&6 will be in the ordinary call with a weight of 25%. All 70% of the theory is offered again in the extraordinary call.
The grades for the 'laboratory' part (30%) include an individual exam at the lab, the daily assesment of work during the semester at the lab, and the cooperative activity 'robot'.

The overall grade for the course will be the weighted sum of the grades of each assessment item with their respective weights.

Observations for part-time students

The same as full-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Electrónica: teoría de circuitos y dispositivos electrónicos / robert Boylestad, Louis Nashelsky, 2018, 11ª ed
Dispositivos electrónicos / Thomas L. Floyd 2008, 8º ed.
Principios de Electrónica / A.P. Malvino, McGraw-Hill, 2000.
Dispositivos electrónicos y fotónicos : fundamentos / Lluís Prat Viñas, Josep Calderer Cardona 2006