

SUBJECT TEACHING GUIDE

G1476 - Low Voltage Power Supply and Consumption Circuits

Degree in Telecommunication Technologies Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Speciality Optional Subjects				
Course unit title and code	G1476 - Low Voltage Power Supply and Consumption Circuits				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	https://www.teisa.unican.es/				
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	JOSE ANGEL MIGUEL DIAZ				
E-mail	joseangel.miguel@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESOR (S3080)				
Other lecturers					

3.1 LEARNING OUTCOMES

- Acquiring knowledge in advanced modelling of electronic devices for low power applications.
- Understanding novel techniques to design low-power electronic circuits.
- Systematic methodology applied to low-power transconductance (OTA) and operational (OA) amplifiers design.
- Low-power amplifiers and continuous filters analysis.

4. OBJECTIVES

Advanced semiconductor devices.
 Low-voltage and low-power MOS transistor models.
 Building block of low-voltage and low-power amplifiers.
 Design of low-voltage and low-power voltage and transconductance amplifiers.
 Advanced design of low-voltage and low-power operational amplifiers, continuous filters and switching capacitors circuits.

6. COURSE ORGANIZATION

CONTENTS

1	MIS and MOS structures: classic models vs. advanced models.
2	CMOS fabrication technologies and their evolution. EKV model for low-voltage and low-power MOS transistors.
3	Basic building blocks for low-voltage and low-power circuit design: single-stage amplifiers, current mirrors, differential pair, cascode and double-cascode amplifiers, and current and voltage references.
4	Low-voltage and low-power transconductance amplifier (OTA) design, comprising a comprehensive study of the differential pair, current mirrors for active biasing, and cascade amplifiers. Design of one and two-stage OTAs. Detailed analysis of MOS transistor operating regions under low-voltage biasing.
5	Low-voltage and low-power fully-differential amplifier design. Introduction to the most common continuous filter topologies. Introduction to low voltage and low-power switched-capacitor filters.
6	Introduction to ultra-low-power circuit design.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Presentations on selected topics.	Work	No	No	50,00
Low-voltage and low-power mixed-signal circuit design and simulation.	Laboratory evaluation	Yes	Yes	40,00
Virtual platform.	Activity evaluation with Virtual Media	No	Yes	10,00
TOTAL				100,00
Observations				
Observations for part-time students				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

D. Stefanovic; M. Kayan, "Structured Analog CMOS Design". Springer, 2008.