

Program	09TT- Engineering in Telecommunication Technologies and Services
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Course number and name	
Number	950000009
Name	Introduction to Electronics Introducción a la Electrónica
Semester	Y1-S2

Credits and contact hours	
ECTS Credits	4.5
Contact hours	45

Coordinator's name	Pablo Benítez Giménez
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Specific course information		
Description of course content		
<p>This course is the student's first contact with electronics. Emphasis is in the subject in learning basic concepts of modeling of electronic components for the analysis and design in first approximation of simple circuits using them. This includes: (1) The study of the basic semiconductor devices (diodes, bipolar transistors and field-effect transistors) using simple functional models for a variety of regimes (non-linear I-V characteristics for DC and large signals, linear equivalent circuits for the sinusoidal steady-state small signals at medium frequencies); (2) To become progressively familiar with handling those models in practical simple circuits (with one or two active devices), analog and digital.</p>		
List of topics to be covered		
<p>1. INTRODUCTION TO ELECTRONICS; 2. BASIC ELECTRONIC COMPONENTS; 3. P-N JUNCTION DIODES; 4. BIPOLAR TRANSISTORS; 5. FIELD EFFECT TRANSISTORS; 6. OPTOELECTRONIC DEVICES; 7. COMMUTATION CIRCUITS; 8. APPLICATIONS OF ELECTRONICS</p>		
Prerequisites or co-requisites		
<p>It is recommended that the student has passed previously the course on "introduction to analysis of circuits and networks" (Y1-S1). It is also convenient the student has the following previous knowledge of Math topics: First order-approximation of functions in one and two variables. Elemental functions. Ordinary Differential Equations (linear, first order, constant coefficients).</p>		
Course category in the program		
<input checked="" type="checkbox"/> R (required)	<input type="checkbox"/> E (elective)	<input type="checkbox"/> SE (selective elective)

Specific goals for the course

Specific outcomes of instruction

- RA17 - Learn how to think scientifically and to solve problems from the basic laws of physics.
- RA19 - Acquire qualitative and quantitative knowledge of basic physical phenomena, essential to start learning the higher level of complexity.
- RA20 - Understand natural phenomena as a knowledge base for current technologies.
- RA22 - Qualitative and quantitative knowledge of the behavior of the simplest electric circuits necessary for the analysis and design of the basic components of electronic systems and communications.
- RA24 - Knowledge of passive electronic components, active (electronic and photonic)
- RA349 - Descriptive knowledge of electronics as a discipline, with compression and conceptual differentiation between analog and digital systems, and technological foundations upon which rest
- RA350 - Knowledge of basic devices (diodes and bipolar transistors and field effect) by functional models that approximate them for different operating systems (for large signal nonlinear, linear to small signal)
- RA351 - Basic knowledge of the interaction of light with semiconductor materials, and their application to optoelectronic devices (LEDs, laser diodes, photodiodes, solar cells, transistors).
- RA352 – Get familiarized with the management of functional models in simple analog circuits (working point) and medium-frequency amplification.
- RA353 - Basic knowledge of digital circuits and their properties, including the use of simple functional models for analysis of Bipolar, NMOS and CMOS inverters, in particular switching transistors and diodes with external capacitors.

Student outcomes addressed by the course

CEB4, CG1, CG2, CG4, CG5

Bibliography and supplemental materials

A.S. Sedra, K.C. Smith. "Circuitos Microelectrónicos", 5ª Edición edition. Oxford Univ. Press, 2005
 N.R. Malik. "Circuitos Electrónicos: Análisis, Diseño y Simulación". Edit. Prentice Hall, 1997
 J.Millman, A.Grabel. "Microelectrónica". Edit. Hispano Europea, 1993
 Collection of exercises with detailed solutions associated to each chapter, made available to the student in the Moodle tool at www.upm.es

Teaching methodology

<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> problem solving sessions	<input type="checkbox"/> collaborative actions	<input type="checkbox"/> laboratory sessions
Other:			