Program	59EC – Communications Electronic Engineering B. Eng. 59SC – Telecommunications Systems Engineering B. Eng. 59SO – Sound and Image Engineering B.Eng. 59TL – Telematics Engineering B. Eng.

Course code and name	
Code	595024322
Name	Analog Electronics
Semester	S4 [(February-June)]

Credits and contact hours	
ECTS Credits	6
Contact hours	60

Coordinator's name	Arqués Orobón, Francisco José [jose.arques@upm.es]

Specific course information	
Tuition language	Spanish
Description of course content	
The main goal of the course is to give a global vision of a part of the electronics: Firstly the study of passive elements and semiconductors and later the analysis and design of bipolar and unipolar transistor bias circuits. Then the polarized circuits are studied for their use in class A amplification (in its different configurations), for which it is necessary the understanding and analysis of the equivalent models of the transistor in small signal and of the amplifier circuits. Finally it is necessary to study high and low frequencies by the Bode plots and the effect of the feedback on the studied amplifiers.	
List of topics to be covered	
1. Introduction to electronic components. 1.1. Resistors: general principles and types. 1.2. Capacitors, general principles and types. 1.3. Inductors: general principles and types. 1.4. Introduction to semiconductors 1.5. PN Junction: General Principles 2. Polarization Techniques 2.1. Operating ways of a bipolar transistor. 2.2. Bias Topologies of bipolar transistors. 23. Stability factors 2.4. Characteristics of a FET 2.5. Unipolar Transistor Bias Topologies 2.6. Exercises. 3. Equivalent models of transistors	

3.1. Equivalent circuits in small signals. Quadripoles.
3.2. Pi model of bipolar transistors.
3.3. Model of a unipolar transistor.
3.4. Exercises.
4. Small signal and medium frequency amplifiers
4.1. Study of the different configurations in amplification.
4.2. Calculation of gains and impedances in the different configurations.
4.3. Exercises.
5. Frequency response.
5.1. Low frequency analysis.
5.2. High frequency analysis.
5.3. Bode plot.
5.4. Exercises.
6. Introduction to the amplifier feedback.

Prerequisites or co-requisites

- Circuit Analysis I
- Electronics I

Course category in the program

☑ **R (required)**	☐ **E (elective)** *(elective courses may not be offered every year)*

Specific goals for the course

Specific outcomes of instruction

- RA211 – To analyze and design electronic communications circuits.
- RA207 – To analyze and design basic electronic circuits.
- RA206 – To analyze the characteristics of transistors according to models.

Further reading and supplementary materials

– Electrónica. Allan R. Hambley. Pearson Educacion, 2001.
– Electrónica de Potencia: Circuitos, Dispositivos y Aplicaciones. Muhammad H. Rashid. Prentice Hall Mexico, 2005.
– Principles of Transistor Circuits. S W Amos. Elsevier.
– Intuitive Analog Circuit Design, Marc Thompson. Elsevier.
– Electrónica Básica para Ingenieros. Gustavo A. Ruiz Robredo. Printing service, Universidad de Cantabria.
– Moodle.