

DEA-GITI-433 Microelectronics Circuits I

SEMESTER: Fall

CREDITS: 6 ECTS (4 hrs. per week: 2.5 Theory + 1.5 Lab, on average)

LANGUAGE: Spanish

DEGREES: GITI

Course overview

This is an intermediate analog electronics course. It will explore the design and analysis of circuits based on diodes, transistors and operational amplifiers, with a focus on frequency response and stability problems.

Prerequisites

Electrical and electronic circuit analysis, in steady state (AC and DC) and in transient regime. Ideal operational amplifier and basic configurations, concept of amplification. Fourier analysis of signals. Frequency and time response of a linear system.

Course contents

Theory:

1. Concept of bias and small signal analysis, application to diodes, transistors and operational amplifiers.
2. BJT and FET transistors. Basic amplifier stages. Differential amplifiers. Multistage amplifiers. Power amplifiers (classes A, AB, B and D).
3. Frequency response of amplifiers. High frequency models for the devices. Miller effect.
4. Feedback; theory, configuration and application to amplifiers.
5. Stability of feedback amplifiers. Compensation. Frequency response of compensated amplifiers.

Laboratory:

The first part of the course the lab practices will be oriented to the deep understanding of the theoretical concepts. It will focus on the behavior of the devices and on the operation of complex circuits and their analysis and debugging.

The second part laboratory will be oriented to a complete design that will be developed by the students in small teams.

Textbook

- D.A. Neamen, “Microelectronics: circuit analysis and design”, Mc Graw Hill, 4th edition, 2009

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the final exam of 4 over 10.

The overall grade is obtained as follows:

- Final exam 45%.
- Other exams 20%. Typically there is 1 mid-term exam.
- Lab exams or evaluations 25%.
- Performance during the lab sessions 10%.