UNIVERSITÀ DI PAVIA

Anno Accademico 2019/2020

ELECTRONICS II B

Enrollment year	2017/2018
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-INF/01 (ELECTRONICS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC AND COMPUTER ENGINEERING
Curriculum	Elettronica
Year of study	3°
Period	2nd semester (02/03/2020 - 12/06/2020)
ECTS	6
Lesson hours	84 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	MANSTRETTA DANILO - 3 ECTS MAZZANTI ANDREA - 3 ECTS
Prerequisites	Knowledge of circuit theory and applied electronics (analog) with particular reference to the MOS and BJT transistors, operational amplifiers, Bode plots. Familiarity with the use of the Fourier transform, the Laplace transform, and the complex numbers.
Learning outcomes	The course aims to complete the basic training of the student in analog and mixed signal electronics making use of an intensive laboratory measurement activity and of circuit simulation. At the end of the course the student should have acquired knowledge on architectures of simple electronics systems, ranging from multistage linear and non linear circuits, signal conditioning stages, waveform generators. He/she will know the systems for the signal conversion from analog to digital and vice versa and the theory of noise in circuits.

Course contents

1) Classification of electronic filters.
2) Filter approximation Butterworth and Chebyshev filters.3) First and second order transfer function and their implementation using operational amplifiers and RC circuits.
4) Sensitivity of the filter transfer function.
Introduction to Gm-C and Switched Capacitor filters.
Electrical Noise
1) Analytical tools to analyse electrical noise.
2) Noise sources in electronic components.
3) Computation of the equivalent input noise in an amplifier.
Oscillators ad PLL
1) Sinusoidal oscillators: basic operation principles and analysis of RC, LC and crystal oscillators.
2) Relaxation oscillators and waveform generators: operation principles and analysis of the most common implementations.
3) Voltage controlled oscillators and operation principle of a phase locked loop PLL.
Introduction to the use of LabView through the design of an Analog to Digital converter.

Teaching methods

Lectures (hours/year in lecture theatre): 22
Practical class (hours/year in lecture theatre): 15
Practicals / Workshops (hours/year in lecture theatre): 43
The lecture are done sing the black board and sometime integrate with foils.
The practical classes are done using the black board and they involves reviewing topics to be known solving examples of analytical calculations. and verifying the knowledge acquired by the students.
The workshops are done with the use of the circuit simulator and the measuring lab equipment.

Reccomended or required readings

A.S. Sedra, K.C. Smith. Microelectronics Circuits. Spice manual; Data Sheets e Applications of electronic components. Plus notes from the instructors.

Assessment methods

The exam is made up of a written part, to be taken at the end of the first module, and of an oral part to be taken at the end of the second modules. The written part accounts for up to 40% of the final score but it is not mandatory. If the student passes the written exams with a score of at least 24/30 the topics of the first module will not be included in his/her oral exam. If the student does no take the written or does not pass it with a score of at least 24/30, the topics of the first module are included in the oral. The written exam includes 2 or 3 circuit problems and about 20 questions with multiple answers. The oral exam varies depending if the student has taken the written or not and on its outcome. In general the oral wants to evaluate the level of understanding of the fundamental topics of the course and the student ability to solve circuit problems. In some cases the oral may include a discussion of the written exam.

Further information

The exam is made up of a written part, to be taken at the end of the first module, and of an oral part to be taken at the end of the second modules. The written part accounts for up to 40% of the final score but it is not mandatory. If the student passes the written exams with a score of at least 24/30 the topics of the first module will not be included in his/her oral exam. If the student does no take the written or does not pass it with a score of at least 24/30, the topics of the first module are included in the oral. The written exam includes 2 or 3 circuit problems and about 20 questions with multiple answers. The oral exam varies depending if the student has taken the written or not and on its outcome. In general the oral wants to evaluate the level of understanding of the fundamental topics of the course and the student ability to solve circuit problems. In some cases the oral may include a discussion of the written exam.

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