COURSE SYLLABUS

Solid State and Electronis Laboratory

2021-1-F1701Q129

Aims

Analysis and design of analog integrated circuits in CMOS technology by using CAD software CADENCE.

To measure with problems of solid state Physics from an experimental point of view by advanced

experimental techniques based mainly on optical spectroscopy.

Contents

Experiments of electronics or solid state laboratory.

Detailed program

For the students electronics oriented the course deals with the analysis and the design of analog integrated circuits using CAD software Cadence performed by groups of two students. The laboratory activity is introduced by lectures on; CMOS technology, analog switches, current mirrors, currente and voltage references, gain stages, operational amplifiers. Example of experience: Design of a current mirrors, of a bandgap reference, of on operational amplifier with single-stage or two-stages, of an analog filter.

For the students solid state physics oriented the course consist in a laboratory experience performed by a study group of two or three students. The laboratory activity will be preceded from introductory lessons on the correlation

between physical properties of solids and techniques of experimental investigations. Examples of experiences: Photoluminescence of inorganic semiconductors of III/V group and of their quantum structures. Polarized photoluminescence and spin of group IV semiconductors. Raman spectroscopy.

Prerequisites

Bachelor in physics or equivalent.

Teaching form

For the students interested to the Electronics part, during the Covid-19 outbreak, lectures will be delivered online and will be both synchronous and asynchronous. Remote exercise will be added together with few in presence events.

For the students interested to the Solid-State part, during the Covid-19 outbreak, lectures will be delivered online and will be primarily asynchronous but dedicated synchronous events will also be planned. Besides a theoretical introduction and simulations to be developed in smart working, at the end of the course there will be a practical session in the lab.

Textbook and teaching resource

References:

A. Baschirotto "Dispense di Microelettronica"

Gray, Hurst, Lewis, Meyer, "Analysis and design on analog integrated circuits"

F. Maloberti, "Analog designfor CMOS VLSI systems"

B. Razavi, "Design of analog integrated circuits"

F. Wooten "Optical Properties of Solids", Academic Press

W. G. Driscoll ed. "Handbbok of Optics", McGrow-Hill

M. Cardona "Modulation Spectroscopy" (Solid State Physics , Supplement 11), Academic Press

E. D. Palik ed. "Handbook of Optical Constants of Solids", Academic Press

"Photomultiplier Tube", Hamamatsu

"Guide for Spectroscpy", Jobin Yvon Horiba

Semester

first semester

Assessment method

During the Covid-19 outbreak, exams will be online using WebEx. A dedicated news will be posted on the e-learning page of the course with a public link to freely access the virtual room where the exam will take place.

Office hours

During the Covid-19 outbreak

For Electronics students, discussions with prof. Baschirotto will take place using the WebEx upon appointment (contact via mail andrea.baschirotto@unimib.it).

For Solid-State students, discussions will take place using the WebEx personal room of Fabio Pezzoli.