UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Laboratorio di Stato Solido ed Elettronica II

2021-1-F1701Q130

Aims

Design capability for an analog MOS integrated circuit

Addess problems of solid state physics from an experimental point of view by advanced experimental techniques based scanning microscopy, opical spectroscopy tecniques.

Contents

For the student electronics-oriented, the course consists in the full design of an analog CMOS circuit by means of the simulation software Cadence

For the students of solid-state-oriented, the course consist in a laboratory experience performed by a study group of two or three students

Detailed program

For the students Microelectronics oriented, the course is mainly based on laboratory sessions, using Cadence (the leading software for analog/mixed-signal integrated circuits design). The main purpose of the laboratory is to understand and learn the most important aspects of the design/simulation environment. The working groups will be composed by two students.
The main topics of this part of the course are:
1) Creating a schematic and symbol.
2) Simulating simple analog circuits using Analog Design Environment.
3) Running process/voltage/temperature simulations.
4) Running Montecarlo simulations.
The reference analog circuits used for design and simulations are: current mirror, differential amplifier, 1st order Analog Filter.

For the student of Solid State Physics oriented

AFM (atomic force microscopy)

Raman Spectroscopy

Photoluminescence Spectroscopy.

Radiative recombination processes in semiconductors

Phonons in Semiconductors

Introductory elements of the nucleation theory

Introductory elements of epitaxial growth

Confinements effects in semiconductor nanostructures

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 primarily synchronous. 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

Lecture notes provided by the instructor

G. Agostini and C. Lamberti, “Characterization of Semiconductor Heterostructures and Nanostructures”, Elsevier Science

Markov, Ivan V. , “Crystal Growth for Beginners: Fundamentals of Nucleation, Crystal Growth, and Epitaxy”, World Scientific Pub Co Inc

Charles Evans & Richard Brundle & Wilson Shaun, “Encyclopedia of Materials Characterization: Surfaces, Interfaces, Thin Films”, Butterworth-Heinemann

Ivan Pelant and Jan Valenta, "Luminescence Spectroscopy of Semiconductors", Oxford University Press

M. Fox, "Optical Properties of Solids", Oxford University Press

J. H. Davies, "The physics of low dimensional semiconductors", Cambridge University Press.

Semester

second 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.