AGENDA OF TCAD COURSE - Academic Year 2014-2015

EACH SLOT CONSISTS OF TWO-HOUR CLASS

Date	Teacher	Subject	Room
25/02/15	MR/GBB	**Course introduction + introduction to TCAD.** Course introduction: To whom the course is addressed, aim of the course, schedule, prerequisites, exams, references, thesis available (MR). Introduction to TCAD: Introduction to physical modeling. What is TCAD? Why TCAD? A link to the context (GBB).	5.2
04/03/15	GBB	**A simulation primer.** Definition of equilibrium and out-of-equilibrium. Static, transient and AC simulations. How to simplify the simulation domain. Numerical methods from a TCAD user perspective (meshing, Gummel and Newton iterations, solvers).	5.2
11/03/15	MR	**Mathematical model of Semiconductor devices I.** Drift-Diffusion equations.	5.2
18/03/14	MR	**Mathematical model of Semiconductor devices II.** Discretization of the Drift-Diffusion model for numerical simulations.	5.2
25/03/14	GBB	**Overview of Synopsys Sentaurus TCAD.** Sentaurus Tools, TCAD simulation flow, introduction to Sentaurus Workbench (SWB), Sentaurus Structure Editor (SDE), and Sentaurus Device (Sdevice).	Lab (ex. 3-2)
01/04/14	GBB	**Pn-junction laboratory I.** - Review of the basic properties of the diode (band diagram at equilibrium, direct and reverse bias, carrier concentration profiles; IV curve and threshold voltage compact model), setup of SWB.	Lab (ex. 3-2)
08/04/14	GBB	**Pn-junction laboratory II.** Implementation of SDE and Sdevice input files (SDE command file, Sdevice command file)	Lab (ex. 3-2)
15/04/14	GBB	**Pn-junction laboratory III.** Implementation of Sdevice parameter file. Run of the simulations and individual debugging.	Lab (ex. 3-2)
22/04/14	GBB	**Pn-junction laboratory IV.**Post-processing of the simulation results (band diagrams at equilibrium, direct and reverse bias, carrier concentrations profiles; IV curve and threshold voltage: Silicon, Germanium, and GaAs diodes; effect of Schockley-Read-Hall recombination-generation). Some comments about Integrated Diodes.Qualitative understanding of band-to-band-tunneling.	Lab (ex. 3-2)
29/04/14	GBB	**MOSFET laboratory I.** Qualitative description of MOSFET working principles, resistive operation, saturation region, channel length modulation, velocity saturation. Main figures of merit of MOSFET device, output characteristics and turn-on characteristics.	Lab (ex. 3-2)
06/05/14	GBB	**MOSFET laboratory II.** Setup of SWB, implementation of SDE input file (part I).	Lab (ex. 3-2)
13/05/14	GBB	**MOSFET laboratory III.** Implementation of SDE input file (part II) and of Sdevice input file (part I)	Lab (ex. 3-2)
20/05/14	GBB	**MOSFET laboratory IV.** Implementation of Sdevice input files (part II). Post-processing of the simulations: energy bands and electron concentration at equilibrium, high V_{GS}, high V_{GS} and high V_{DS}. Turn-on characteristics varying gate length, oxide thickness and substrate doping. Output characteristics varying gate length.	Lab (ex. 3-2)
27/05/14	GBB	**END-OF-COURSE ASSIGNMENT.**	Lab (ex. 3-2)
03/06/14	GBB	**THEORETICAL QUESTIONNAIRE.**	5.2