ELEC1330 Physics of electronics

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Vincent Bayot (coord.), Denis Flandre, Jean-Pierre Raskin
Language: French
Level: First cycle

Aims

After this course students will be able to
- explain physical electronics bases and use them to solve simple problems in semiconductor physics
- show first-order physical understanding of the behaviours and modellings of basic semiconductor devices, towards their exploitation in the courses of the Electronics module and following courses in Semiconductor devices

Main themes

Establish physical bases of electronics : band structure, phonons, charge transport equations and carrier generation and recombination mechanisms.
Study physical behaviour and establish first-order models in static and low-frequency small-signal operation, for the three basic electronics devices : PN junction, bipolar transistor and MOS transistor

Content and teaching methods

Theoretical lecturers, hands-on laboratories, APPs and APEs. Some parts of the course are introduced through APP activities (projects), other parts introduce theoretical concepts first and apply them in APE next (exercices).
Hands-on labs propose to characterize the devices under study and confort experimental data with theoretical models or calculations. The approach implies a significant discussion of experiments vs theory and the critical validation of necessary simplifying hypotheses and approximations.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites :
Quantum mechanics
Assessment :
Written exam with a theoretical part and an exercices part. The theoretical part includes questions of development and understanding of concepts. The exercices are similar to those done in APP and APE problems

Other credits in programs

FSA12BA	Deuxième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)	
FSA13BA	Troisième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)	
INFO22	Deuxième année du programme conduisant au grade d'ingénieur civil informaticien	(5 credits)	
MATR22	Deuxième année du programme conduisant au grade d'ingénieur civil en science des matériaux	(5 credits)	Mandatory