



# Faculté des sciences appliquées

## FSA

### ELEC2330 PHYSICS OF ELECTRONICS

[30h+30h exercices] 5 credits

This course is taught in the 1st semester

**Teacher(s):** Vincent Bayot (coord.), Denis Flandre, Jean-Pierre Raskin  
**Language:** french  
**Level:** 2nd cycle course

#### 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 lectures, 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

<b>ELEC21</b>	Première année du programme conduisant au grade d'ingénieur (5 credits) civil électricien	Mandatory
<b>ELEC22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil électricien (5 credits)	
<b>MATR22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil en science des matériaux (5 credits)	Mandatory