

EE-557

**Semiconductor devices I**

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Obl.
Energy Science and Technology	MA1, MA3	Opt.
MNIS	MA3	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

This course aims to give a solid introduction to semiconductors, from Silicon to compound semiconductors, making the connection between the physics and their application in real life. We will explore several experimental techniques related to current semiconductor research and development.

**Content**

1. Introduction to Semiconductor Physics
2. Carrier Generation and Recombination
  - link to LEDs and Solar cells
3. Charge Transport
  - **Lab session**
  - Hall measurements
4. Non-uniformly doped semiconductors
  - Schokley equations.
5. p-n junctions
6. Metal semiconductor junctions
  - Schottky and Ohmic junctions
7. Metal Oxide Semiconductor MOSFETs
8. Semiconductor junctions (Compound semiconductors)
  - Band structure simulations
9. Semiconductor devices of today
  - High electron mobility transistors (HEMTs)
  - Power transistors

**Keywords**

Semiconductors, compound, Silicon, GaAs, GaN, transistors, LEDs, solar cells, HEMTs

**Learning Prerequisites**

### **Recommended courses**

Physique général III et IV, Electronique I et II

### **Teaching methods**

Lectures  
Assignments  
Lab sessions  
Simulations

### **Assessment methods**

homeworks, mid-term and final exams

### **Resources**

#### **Ressources en bibliothèque**

- [Integrated microelectronic devices : physics and modeling /del Alamo](#)

#### **Notes/Handbook**

Notes and slides will be published on moodle after each lecture