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.
Minor in Quantum Science and Engineering	H	Opt.
Quantum Science and Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
Lecture	3 weekly
Exercises	1 weekly
Number of positions	

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
   - 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

Moodle Link

- https://go.epfl.ch/EE-557