EE-557 **Principles of semiconductor devices**

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 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 also explore several experimental techniques related to current semiconductor research and development.

Content

1. Introduction to Semiconductor Physics
2. Carrier Generation and Recombination
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
   - HEMTs
   - LEDs
   - Solar cells

Keywords

Semiconductors, compound, Silicon, LEDs, solar cells, HEMTs

Teaching methods

Lectures
Lab sessions
Simulation sessions

Assessment methods

exercises
mid-term exam
final exam

Supervision

Office hours	Yes
Assistants	Yes

Resources

Bibliography

Del Alamo, course materials for 6.720J Integrated Microelectronic Devices, Spring 2007. MIT OpenCourseWare (http://ocw.mit.edu/), Massachusetts Institute of Technology.
S. M. Sze, Physics of Semiconductor Devices

Ressources en bibliothèque

- Physics of Semiconductor Devices / Sze
- Integrated Microelectronic Devices / Del Alamo

Notes/Handbook

Class notes and slides will be posted on moodle after each class.

Moodle Link

- https://moodle.epfl.ch/course/view.php?id=15349