EE-537 **Modeling of emerging electron devices**

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

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Written
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	2 weekly
Number of positions	

Summary

The course aims at modelling the most relevant semiconductor devices that will be used in nanoelectronics, such as multigates and junction-less transistors. Starting from the basis, we will focus on various analytical approaches in order to explain in detail how these devices work.

Content

- Introduction.
- Basics of MOSFETs
- Alternative modeling of MOSFETs
- Modelling the Double Gate FET
- Charge based Modelling of the DG FET
- Quantum Confinement in DG FET
- The Gate All Around nanowire FET
- Concepts of Equivalent Parameters in MUGFET
- Charge based modelling of the Junction Less FET: double gate and nanowire
- Concept of Ballistic Transport in nanoscaled transistors
- Is the ballistic FET a vacuum tube ?
- The contact resistance in nano devices
- A simple picture of transport in ‘molecules’

Learning Prerequisites

Important concepts to start the course

Basic knowledge on semiconductors

Learning Outcomes

By the end of the course, the student must be able to:

- Systematize a problem involving semiconductors
- Analyze a semiconductor device
- Synthesize infomation

Transversal skills

- Use a work methodology appropriate to the task.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Demonstrate the capacity for critical thinking

Teaching methods

Lectures
Exercices

Expected student activities

Solve some basic exercices

Assessment methods

Written exam

Supervision

Office hours	Yes
Assistants	Yes