

ECE277A, Fall 2010
Advanced Semiconductor Devices I

Course code 18455
Graduate Course, 3 units

Professor & Class Schedule

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Lect. M/W 11:00-12:20 P.M. DBH 1429
Office hours M/W 12:30-2:00 P.M.

Textbook:

Fundamentals of Modern VLSI Devices (2nd Edition)
Y. Taur and T. Ning, Cambridge University Press (2009), ISBN 978-0-521-83294-6

Grade:

15% Midterm 1 (Oct 13), 30% Midterm 2 (Oct 25), 15% Presentation, 40% Final

Course Outline

1. Overview of VLSI technology
2. Review of Semiconductor physics fundamentals, such as band gap, effective mass, impurities, carrier concentration, Fermi level, mobility, basic equation used in semiconductor device analysis
3. MOS capacitor: two terminal MOS structure, energy band bending, MOS capacitance, threshold voltage determination, gate dielectrics properties, and new gate materials.
4. MOSFET theories and device model: Three terminal/four terminal structure, inversion layer, body effect, level-1 model, CMOS latch-up, model parameter extraction, memory, logic gate.
5. MOSFET scaling properties: short channel effects, narrow width effects, velocity saturation, drain-induced barrier lowering, punch-through, hot carrier effects, device breakdown, scaling theory.
6. RF CMOS