Principles of Semiconductor Devices

(집적 회로 소자)

Hanyang University
Division of Electronics & Computer Engineering
Semiconductor Lab
Han Sub Yoon
Syllabus

- **Lecture name**: 집적 회로 소자 (ELE 367)
- **Lecture time**: Tue. (09:00-10:30, 13:00-14:30, 14:30-16:00)
- Thu. (09:00-10:30, 13:00-14:30, 14:30-16:00)
- **Professor**: Han Sub Yoon (윤한섭)
- **Professor room**: Engineering Center 313
- **Contact**: 011-385-9918, hansubyoon@hanyang.ac.kr, hansubyoon@empal.com
- **Homepage**: [http://semicon.hanyang.ac.kr](http://semicon.hanyang.ac.kr)

**Text**: Sima Dimitrijev, Principles of Semiconductor Devices, Oxford University Press


**Reference**:
- Robert F. Pierret, Semiconductor Device Fundamentals, Addison-Wesley
- Sima Dimitrijev, Understanding Semiconductor Devices, Oxford
- Muller, Device Electronics for Integrated Circuits, 3rd Ed., Wiley

**Grades**
- Attendance: 10%
- Mid-term exam.: 30%
- Final exam.: 50%
- Homework: 10%
Introduction

✓ Week 01: Introduction. 반도체 역사, Technology Trends
✓ Week 02: Quantum Physics
  - Energy Level, Particle-Wave Duality, Schroedinger Equation, Energy Band Theory
✓ Week 03: Transport Phenomena
  - Diffusion, Drift, Mobility, Continuity Eq., Recombination, etc.
✓ Week 04: Resistor, PN Junction Diode
✓ Week 05: MOSFET
✓ Week 06: BJT
✓ Week 07: Fabrication; Oxidation, Lithography, Etching, Diffusion/Implantation, Deposition
  - Resistor, Capacitor, Diode, MOSFET, BJT, BiCMOS, etc.
✓ Week 08: Midterm Exam
✓ Week 09: Circuit Simulation Tool; SPICE 소개
✓ Week 10: SPICE Model for MOSFET;
  - Level 1, 2, 3
  - BSIM 1, 2, 3, 4,
✓ Week 11: Model Parameters, Parameter Extraction Method & Optimization
✓ Week 12: Circuit Simulation
✓ Week 13: MOS-Based Memory Devices; DRAM Cell and SRAM Cell
✓ Week 14: Non-Volatile Memory Devices I; Flash Memory Cell – NOR & NAND Type
✓ Week 15: Non-Volatile Memory Devices II; SONOS and NFGM, FeRAM, MRAM, PoRAM
✓ Week 16: Final Exam