



Semiconductor Devices for Integrated Circuits

積體電路元件

ENE5330 積體電路元件

Semiconductor Devices for Integrated Circuits

- Professor: 林崇榮 (cjlin@ee.nthu.edu.tw)
- TA: 林唯華 (whlin.starlab@gapp.nthu.edu.tw)
- Handouts and Reference Books

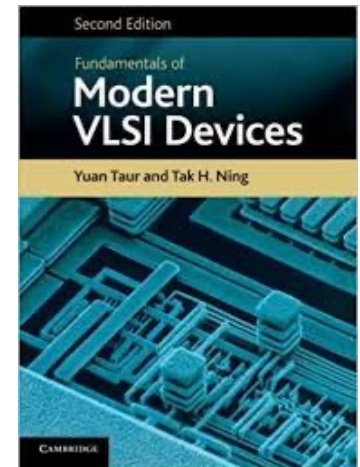
1. Handouts (Downloaded)

2. Physics of Semiconductor Devices (Ref.)

Simon M. Sze, Yiming Li, Kwok K. Ng

3. Fundamentals of Modern VLSI Devices (Ref)

Yuan Taur, Tak H. Ning



Course Description

This graduate course is designed to provide an in-depth exploration of Semiconductor Devices for Integrated Circuits, bridging the gap between fundamental physics, microelectronics, and professional VLSI device knowledge. By a combination of engaging lectures and hands-on assignments, students will learn on a comprehensive journey covering important aspects of semiconductor technology essential for contemporary integrated circuits. The curriculum begins with a foundational concepts such as semiconductor band diagram and structure, carrier conduction in semiconductors, junctions, MOS capacitor, planar and 3D MOSFETs, memory devices, and bipolar junction transistors, and power devices. Students will obtain a deep understanding of the intricacies of these devices and their roles in modern electronics. A central focus of the course is on the exploration of device scaling limits, operational concepts, and anticipation of future trends. The dynamic field of semiconductor technology is evolving rapidly, and this course equips students with the knowledge and insights needed to navigate emerging challenges and opportunities.

Syllabus (for 16 Weeks)

- **Energy States and Band Structures**
- **Carrier Transportation and Conduction**
- **Junction Mechanism and Diode Operations**
- **2D and 3D MOSFET Technologies**
- **Bipolar and Power Device Technologies**
- **Semiconductor Memory Technology**

Grading Policy

- **10% - Attendance**
- **30% - Chapter Tests**
- **60% - Mid/Final Exams**