

**ENEE 601 SPRING 2007**  
**SEMICONDUCTOR DEVICES AND TECHNOLOGY**

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GRADER: TBD

MAIN TEXT: Fundamentals of Modern VLSI Devices, Taur & Ning, Cambridge Press, 2002

REFERENCE TEXTS: Device Electronics for Integrated Circuits, 3<sup>rd</sup> ed, Muller, Kamins & Chan, Wiley Interscience 2003

The Pierret Series in Semiconductor Technology, Addison-Wesley Press. This is an outstanding series of “monographs” on various topics related to the course: semiconductor physics, bipolar and MOS transistors, fabrication, etc.

**COURSE TOPICS**

1. An introduction to semiconducting materials
2. Some quantum mechanics of solids and charge transport
3. Topics in process technology
4. Two terminal devices: resistors, diodes (Schottky and junction)
5. Junction transport phenomena
6. Bipolar transistor basics
7. Second order effects in bipolar devices
8. Advanced bipolar devices – SiGe
9. MOSCAPs
10. MOSFETs – 1<sup>st</sup> order models
11. MOSFETs – 2<sup>nd</sup> order models
12. Advanced topics in component technology: CCDs, wide-bandgap materials, high electron mobility transistors (HEMTs), dual gate structures (FINFETs, etc.)
13. Issues in scaling – What happened to Moore’s Law?