

Course Syllabus - ECE 657 Semiconductor Devices (3.00)**WED 6:00 – 8:50 pm / FMH 409****● Course description:**

This course introduces the fundamentals of semiconductor materials and devices that comprise modern integrated circuits. Students who successfully complete the course requirements will understand the physical operation of modern semiconductor devices, model and predict device characteristics under various conditions, and design semiconductor devices for targeted applications. Course topics include:

1. Electrons & Atoms, Chemical Bonds, Crystal Structures, Energy Bands, and Semiconductor Materials
2. Equilibrium Carrier Statistics
3. Carrier Transport, Non-equilibrium statistics
4. Crystal Growth and Device Fabrication
5. p-n Junction Electrostatics
6. p-n Junction Current-Voltage Characteristics
7. Metal-semiconductor Junctions, Semiconductor Heterojunctions
8. MOS Capacitors
9. MOS Field-Effect Transistors
10. Bipolar Junction Transistors
11. Modern CMOS Technology
12. Optoelectronic Devices: Photodetectors, Light-Emitting Diodes, Solar Cells, Lasers

● Prerequisite:

Undergraduate Solid State Physics or Electronic Devices

● Textbook:

- Lecture slides
- Semiconductor Device Fundamentals, Robert F. Pierret, Addison-Wesley, 1996

● Other reference material:

- Physics of Semiconductor Devices, Simon M. Sze, Wiley, 2006
- Solid State Electronic Devices, Ben G. Streetman, Prentice Hall, 2000

● Instructor:

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215 ECEC (You are welcome to stop by my office anytime during the office hours. Please email me ahead to confirm that I am in my office.)

● Grading:

Midterm exam: 35%
Final Exam: 45%
Quiz: 20%

- **Exam dates (tentative)**

Midterm exam, 10/22/2025, 6-8pm, FMH321

Final exam, 12/17/2025, 6-8pm, FMH321

- **Academic integrity:**

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*