

# MTSE-4070 ELECTRONIC MATERIALS

## Spring 2012 Syllabus

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Tuesdays 2:00-5:00 p.m. – Discovery Park, Room: D 207B,  
Instructor: Professor El Bouanani Phone: 369-8109; E-mail: [bouanani@unt.edu](mailto:bouanani@unt.edu),  
Office hours: open door policy or appointment via e-mail

### Text Book:

Principles of Electronic Materials and Devices, 3<sup>rd</sup> Edition by S.O.Kasap, ISBN: 0-07-295791-3

### Other useful references:

- Electronic Properties of Materials, by Rolf E. Hummel (3ed Edition, Springer, New York, 2000)
- Physics of Semiconductor Devices, by S.M. Sze (2nd Edition, Wiley, New York, 1981)
- Introduction to Solid State Physics, by C. Kittel (7th Edition, Wiley, New York, 1996)
- Microchip manufacturing, by S. Wolf, ISBN: 0-9616721-8-8

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## PLAN OF STUDY

### **Elementary Concepts and Electrical Conduction**

**Modern Theory of Solids:** Band theory of solids, Density of states, Boltzmann and Fermi-Dirac statistics, Electron effective mass and Fermi Energy,

**Semiconductors:** Intrinsic and Extrinsic semiconductors, degenerate semiconductors, conductivity, recombination and minority carrier injection, Schottky Junctions and Ohmic Contacts.

**Semiconductor Devices:** Basics of a pn junction, Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET), Thermoelectrics, Piezoelectrics, Light Emitting Diodes (LEDs), Solar Cells.

**IC fabrication:** Integrated-circuit types, Overview of semiconductor manufacturing, silicon wafer production, thin films depositions, diffusion and ion implantation, oxidation, plasma processing, lithography, interconnects,...

**MIDTERM EXAMS:**                    **03/6/2012**    LOCATION: DP; D207B    2:00-5:00 PM  
   **04/3/2012**    LOCATION: DP; D207B    2:00-5:00 PM

**FINAL EXAM (Comprehensive):** **05/8/2012**    LOCATION: DP; D207B    2:00-5:00 PM

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**GRADES:** 30% Homework; 30% Midterm Exams; 40% Comprehensive Final

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**This is a preliminary course outline. The instructor may change material, course content, and course pace or item sequence at any time.**