

GEORGE MASON UNIVERSITY

ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

FALL 2007

**ECE 699: SEMICONDUCTOR THEORY**

Time and location: W 7:20 pm – 10:00 pm, S&T-II, Room 260

Instructor: Qiliang Li, S&T-II, Room 249, Tel 703-993-1596, Fax 703-993-1601 [qli6@gmu.edu](mailto:qli6@gmu.edu)

Office Hours: W 3:00 – 5:00 pm; other times by appointment.

Required Textbook: “Semiconductor Physics and Applications” by Minko Balkanski, R. F. (Richard Fisher) Wallis (ISBN 0198517408).

**COURSE DESCRIPTION**

The course is intended to provide the fundamental knowledge (physics) of semiconductor materials, with emphasis on the properties of electrons in semiconductors. Semiconductor theory is the fundamental basis of all semiconductor devices including state-of-the-art Complementary Metal Oxide Semiconductor (CMOS) devices and the vast majority of the emerging Nanoelectronics devices. This course will cover crystal structures, lattice dynamics, equilibrium semiconductor statistics, energy band theory, charge carrier transport properties and scattering mechanism.

**REFERENCE LIST**

1. Introduction to Solid State Physics, by Charles Kittel.
2. Semiconductor Physical Electronics, by Sheng S. Li.
3. Essentials of Semiconductor Physics, by W. Tom Wenckebach

**COURSE OUTLINE**

1. Crystal Structure (two weeks)
2. Lattice Dynamics (two weeks)
3. Semiconductor Statistics (two weeks)
4. Energy Band Theory (two weeks)
5. Charge Carrier Transport in Semiconductors (three weeks)
6. Scattering Mechanisms in Semiconductor (two week)

**GRADING**

Homework/project	- 30%
Midterm Exam 1	- 20%
Midterm Exam 2	- 20%
Final Exam	- 30%

The dates of the Midterm exams will be announced in class at least two weeks before each exam, and will depend on the course progress.