EECS 277C: Nanotechnology **Code** 18460
Spring 2011

Textbook: Ferry and Goodnick, *Transport in Nanostructures,* Cambridge University Press
Hanson, *Fundamentals of Nanoelectronics*, Pearson/Prentice Hall
There will also be a reading packet and the lecture notes available in the copy center at the base of Engineering Tower.

Prerequisites: ECE 113A and Physics 51A, or consent of instructor

Outline:

- Introduction to nanoscale systems. Length, energy, and time scales
- Top-down approach to nanolithography: Spatial resolution of optical, deep ultraviolet, x-ray, electron beam, and ion beam lithography.
- Wave-particle duality, quantized energies, particle in a box, Fermi-Dirac distribution function, density of states, concept of dimensionality
- Quantum mechanical tunneling, tunnel diodes
- Single electron transistor, coulomb blockade
- Quantum confinement of electrons in semiconductor nanostructures: two-dimensional confinement (quantum wells). Band gap engineering. Epitaxy.
- Landauer-Buttiker formalism for conduction in confined geometries.
- One-dimensional confinement: Nanowires
- Quantization of electrical resistance: quantum point contacts
- Bottom-up approach. Chemical self-assembly, carbon nanotubes.
- Introduction to quantum methods of information processing

Lecture Hours: Mon/Wed 3:30 pm – 4:50 pm in ICS 259

Instructor: Professor Peter Burke, Electrical Engineering and Computer Science
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Grading Components:

Midterm 1	30%
Midterm 2	30%
Final Exam	40%

Homework: Homework assignments will be given but not graded. If you do not do the HWs and understand the solutions you will probably not pass the course.