**EECS 277C: Nanotechnology Code** 18460

##### Winter 2015

**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 on the course website.*

**Prerequisites:** ECE 170A 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
        + 2d Materials: Graphene & analogs

**Lecture Hours:** Tu/Th 3:30 pm – 4:50 pm in [ET 204](https://eee.uci.edu/toolbox/roomfinder/class.php?ccode=18460&quarter=S11)

**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.