**EECS 277C: Nanotechnology Code** 18700

##### Winter 2017

**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 ICS 213

**Instructor:** Professor Peter Burke, Electrical Engineering and Computer Science

#  2232 Engineering Gateway

949-824-9326 pburke@uci.edu

**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.