**UConn ECE Fall 2016, Class Meeting ABB 124, Tu 6:00pm,**

**F. Jain (office ITE 465, hrs. Tu 1:30-2:30pm, W 1:00-2:30pm)**

**ECE 4243/ENGR 4243/ECE 6243 Nanoscience and Nanotechnology-I**

# Course Outline

### Fundamentals of electron and hole confinement in quantum well, wire and dot heterostructures and confinement of photons in waveguides and 2D and 3D photonic band gap structures, density of states in quantum wires, and quantum dots; Transport in quantum wires and dots including conductance quantization and universal conductance fluctuation, metallic and semiconducting single wall (SWNT) and multi-wall carbon nanotubes; Operation of nano field-effect transistors, single electron transistors, and quantum interference transistors; absorption and emission in quantum wires and dot structures for the analysis and design of quantum wire/dot lasers and modulators; Fabrication methodology to grow and assemble quantum wires and dots including self-assembly and self-organization techniques for light emitting diodes, transistors and lasers.

Textbook and References:

1. G. Hanson, *Fundamentals of Nanoelectronics*, Prentice Hall, 2008.

2. G. Cao, *Nanostructures and Nanomaterials*: Synthesis, Properties and Applications, ICP, 2004.

3. C. Weishbuch and B. Vinter, Academic Press, *Quantum Semiconductor Structures*.

4. F. Jain Supplementary Notes (2016 edition),

Grading is generally based on scores of Pop Quizzes (each popquiz 10 points), Quiz 1 (40 points) , Quiz 2/Take Home Design (half a Quiz) and Term paper, Final, and Home Work (equal one Quiz),

Unofficial TAs: Bander Saman and Jun Kondo (Ph.D. candidates)