Phys 680
Introduction to Nanoscience

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Text Book: Introduction to Nanoscience, S. M. Lindsay, Oxford, 2010

1. Quantum mechanical introduction to nanoscience
   a. Principles of quantum mechanics of confined systems
   b. Wave-particle duality observed by photons (Young), by electrons (Hitachi) and by large nanoparticles like \( C_{60} \)

2. Statistical mechanics:
   a. Boltzman Distribution
   b. Partition function
   c. Quantum gases
   d. Chemical kinetics,
   e. Fluctuations in nanosystems
   f. Brownian Motion
   g. Einstein-Smoluchowski equation
   h. Diffusion

3. Tools of the Nanoscience:
   a. Atomic Force Microscopy
   b. Optical Tweezers
   c. Scanning Tunneling Microscopy

4. Nanomanufacturing methods
   a. Litography
   b. Molecular Beam Epitaxy
   c. Focused ion beam milling
   d. Self-assembly
   e. Confined systems like vesicles and micelles

5. Nanobiotechnology

Grading:

Homework: 30 %
Mid-Term: 30 %
Term-paper: 30 %
Class attendance and participation: 10 %