

**Department of Materials Science and Engineering**  
University of Maryland, College Park, Maryland

**ENMA181: Introduction to Nanotechnology**

**Course Description:** Seminar series introducing nanotechnology and the conceptual and analytical challenges for developing future nanomaterials. Class activities and guest lectures cover the role of nanomaterials in materials science and engineering.

**Prerequisites:** Freshman standing.

**Textbook:** None; Series of lectures on current research in nanotechnology.

**Other Resources:** <http://www.ajconline.umd.edu> (course administration & documents)

<http://www.vjnano.org/nano/> Virtual journal of Nanoscience & Technology

<http://www.vjbio.org/bio/> Virtual journal of Biological Physics Research

<http://www.vjquantuminfo.org/quantuminfo/> Virtual journal of Quantum Information Research

<http://ojps.aip.org/> Online search of AIP science articles

**Course Goals to meet ABET 2005 Criteria**

1. Student learns about confinement effects at the nanometer scale, and how these relate to quantum mechanics, i.e. the wave nature of the electron.
2. Student learns the basics of scanned probe microscopies, electron microscopies and scattering techniques for characterization of materials at the nm scale.
3. Student learns about techniques for fabrication of nanostructures.
4. Student learns to write and give a presentation.

**Topics Covered:**

Nanostructural Characterization Techniques  
Enhanced decay and fluctuations at the nanoscale  
Confinement effects in nanostructures  
Plasma etching of nanoscale structures  
Self-Assembly of Soft Nanomaterials  
Lithographic techniques for Nanofabrication  
Nanometer-Scale Effects in Ceramic Particles  
Functional Oxide Nanostructures  
Nanosystems  
Magnetic Nanoparticles as Bioprobes  
Bio-Inspired Materials  
Biotechnology

**Grading:**

Grades will be based upon an in class final presentation on nanotechnology research.

You should review for the class what the presentations were about, what you learned, and how you would go beyond what was presented-a new research idea within the field discussed, an additional experiment based on what was discussed. The teams can break up the presentation as they see fit, but both team mates must participate. Each team must turn in a hard copy or soft copy of their powerpoint presentation at the time of their in-class presentation.

**Class Schedule:**   Thursdays, 15:30-16:45  
                                  CHE 2136

**Academic Integrity:**

Academic integrity is essential to a University. The University of Maryland's Code of Academic Integrity can be found in the Undergraduate Catalog. Please read this important document.

**Instructor:**   Prof. Ray Phaneuf  
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                          Office Hours: TTh 13:00-14:00, or by appointment

Prepared by: Prof. Phaneuf   August 2003