

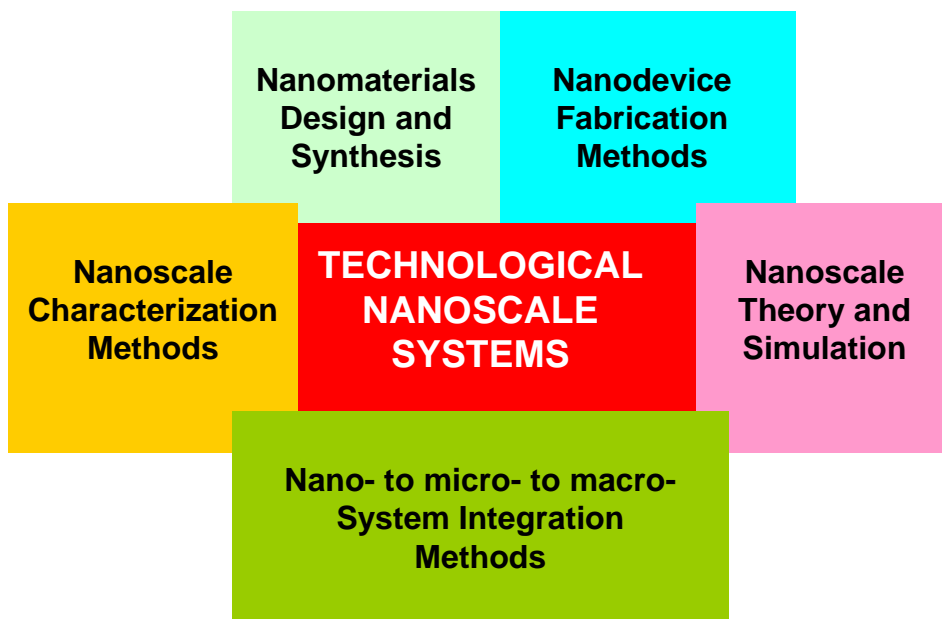
ChBE 4803/8803: Special Topics, Fall 2007
CHEMICAL ENGINEERING IN NANOSCALE SYSTEMS
Georgia Institute of Technology

Instructor: Prof. Sankar Nair

3 Credits

Nanotechnology is a cross-cutting discipline that is enabling revolutionary advances in areas as diverse as energy, electronics, petrochemicals, and biotechnology. It is concerned with the design and analysis of **nanoscale systems**, which present novel challenges from those encountered in macroscopic systems.

This course focuses on applying core chemical engineering fundamentals along with synthesis, fabrication and characterization methods to design and analyze technologically important nanoscale systems. Both nanoscale engineering and the underlying nanoscale science will be emphasized in an integrated approach to nanosystems.



Some specific topics: Mass, heat, momentum and charge transport in nanoscale systems. Applications in separations nanotechnology and single-molecule analysis. Thermodynamics of nanoscale systems. Nanoscale phase behavior, stability, and applications in thin film engineering. Reactive and non-reactive self assembly processes and applications. Catalytic and reactive behavior in nanoscale environments. Construction of nanomachines.

Course format and grading:

- 3 lecture hours. Lectures by Prof. Nair and occasional 'guest lectures' by other GT faculty.
- No prerequisites except college-level physics and chemistry
- Grades are based on HWs and a Term Project (in groups of 3-4 students). There will be no Exams.

Questions ? Contact Dr. Nair (sankar.nair@chbe.gatech.edu, 404-894-4826).

ChBE 4803B/8803B: Chemical Engineering in Nanoscale Systems: Syllabus

Date	Topic
<i>Aug 22, Aug 24</i>	Overview and introduction
<i>Aug 29, Aug 31, Sep 5</i>	Nano “Building Blocks”: Biological Nanotubes and Nanopores
<i>Sep 7, Sep 12, Sep 14</i>	Nano “Building Blocks”: Synthetic Nanotubes
<i>Sep 19, Sep 21</i>	Nanoparticles for heat transport applications: Nanofluids
<i>Sep 26, Sep 28, Oct 3</i> <i>HW #1 due Oct 3</i>	Nanoparticles and nanostructured materials for catalysis
<i>Oct 5, Oct 10, Oct 12</i>	Directed assembly of nanostructured materials in solutions
<i>Oct 19</i>	Guest Lecture : Dr. Ravi Doraiswami, School of ME Topic: Nano/Micro Integration
<i>Oct 24, Oct 26, Oct 31</i>	Nanostructured and Nanocomposite Thin Films
<i>Nov 2</i> <i>HW #2 due Nov 2</i>	Building organic nanostructures from polymers
<i>Nov 7</i>	Building and operating nanomachines
<i>Nov 9</i>	Nanosystem Design Project: Preliminary review discussions
<i>Nov 21</i>	Nanomanufacturing for our energy future
<i>Nov 28, Nov 30, Dec 5, Dec 7</i>	Nanosystem Design Project Presentations and Discussion