Course Announcement for Winter Quarter 2008
Please contact instructor for more information

Nanoscale Science I

Contact Mechanics and Rheology on the Nanoscale

ChemE 554 (3 credits)

Tue/Thu: 1:30 - 2:50 p.m.
CHL 025

Instructor: ***René Overney*** (e-mail: roverney@u.washington.edu)

This course is tailored towards Graduate and Senior Undergraduate Students at the University of Washington and to Industry with interest in small interfacially confined systems in biology, chemistry, engineering, materials science, and/or physics.

Short Abstract

As technology is moving towards interfaces, today's major challenge is to find common denominators to describe exotic material and transport properties on the sub-100-nanometer scale. Thereby, our multifaceted attempts converge on the new discipline called *Nanoscience*. This course provides an introduction to this new field, approaching it from a classical phenomenological perspective, rather than a quantum mechanical point of view. Classical material theories, such as basic rheological concepts and field theories will be introduced and discussed based on their applicability and shortcomings in constrained geometries on the nanoscale. This course addresses current issues in electronics, bioengineering and biomimetics, organic power systems, separation processes, and tribology (friction, adhesion, lubrication, wear).

Course Contents

- Introduction into classical contact mechanics, rheology and nanoscience and nanotechnology
- Friction and lubrication on the molecular scale
- Principles and concepts of interaction forces and dissipation
- Novel Methods: Scanning Probe Microscopy (SPM), Surface Forces Apparatus (SFA).
- Dynamics in confined systems, finite-size effects on physical properties and processes.
- Nanotechnological applications involving organic materials and hybrid systems.

Course Book/Material

Course Material will be provided. Copying costs ~ $15.00.

Course Outline: http://courses.washington.edu/overney/Outline554.html