

Materials Science and Engineering
Spring '05 Seminar Series

Prof. Nicholas Zabaras

Cornell University

Mechanical & Aerospace Engineering

Thursday, May 5, 2005

4:30 p.m., Bard 140

**COMPUTATIONAL TECHNIQUES FOR
MATERIALS-BY-DESIGN**

We will highlight a number of mathematical, computational and statistical developments towards the design of processes leading to products of desired properties. We aim to point to techniques that may be important in controlling microstructure-sensitive properties leading to a materials-by-design approach. Material processes of interest include solidification, crystal growth and thermo-mechanical processes. For example, we will show how crystal growth processes can be controlled using optimally designed furnaces and externally applied magnetic fields.

Issues to be discussed include needs for multiscale stochastic materials modeling and design, information-theoretic approaches to linking length scales, mathematical representation and classification of microstructural features, knowledge-discovery in material databases, stochastic homogenization techniques and the role of uncertainty in materials design. The presentation will finally emphasize the role of data-driven "computational sensorics" approaches towards dynamically coupled experiments and simulation.

<http://www.mae.cornell.edu/zabaras/>

Refreshments will be served @ 4 p.m. in 260 Bard (Lounge)

Late access to Bard Hall can be gained through the Thurston Hall entrance with a Cornell ID