

# *Mechanical Engineering Graduate Seminar*

## *058:191*

### *“An information-theoretic approach for property prediction of random microstructures”*

Presented by  
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#### **Introduction or Abstract:**

Probability distribution functions (PDF) providing a complete representation of property variability in polycrystalline materials are difficult to obtain. Reconstruction of probability distribution of material properties on the basis of limited morphological information is an inverse problem of practical significance since many macroscopic properties depend strongly on geometrical variability of the micro- constituents. We characterize the unknown probabilities of the microstructural parameters making use of the macro-information given in the form of average values (such as average grain sizes) and using the concepts of maximum information entropy (MAXENT) and stochastic geometry. The PDFs are used to generate consistent samples of microstructures whose properties are assessed using a multi-scale framework based on a newly developed fully implicit Lagrangian large strain homogenization framework.

**Bio:** After completing doctoral work in Theoretical and Applied Mechanics, Professor Zabaras joined the faculty of the Mechanical Engineering Department at the University of Minnesota, Minneapolis, MN. He became a Cornell faculty member in 1991. Zabaras is a member of the American Society of Mechanical Engineers, the American Academy of Mechanics and of the Society for Industrial and Applied Mathematics. He received a Presidential Young Investigator Award from the National Science Foundation in 1991. His current research includes the development of robust design simulators for deformation and solidification processes, spectral stochastic methods for modeling of uncertainty propagation in analysis, optimization and design of continuum systems, and development of multi-length scale algorithms for the analysis and design of microstructures in engineering materials.

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3:30 - 4:20 pm  
3505 Seamans Center