

LAURIER SEMINAR SERIES IN Computational Science and Applied & Statistical Modelling (CSASM)



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**Thursday, January 29, 2009
4:00 p.m. Room BA111
Wilfrid Laurier University**

**Prof. Nicholas Zabaras
Cornell University**

Uncertainty Quantification and Management in Multiscale Systems

Abstract: Uncertainty quantification in multiscale systems arises from limited noisy experimental data, and from the inherent randomness in the underlying physical phenomena. Sources of uncertainty may be affiliated with initial/boundary conditions, material properties, constitutive laws, loads, reaction constants, geometry, and topology. In this talk, we will review methodologies that account for the stochastic and multiscale nature exhibited by such systems. In particular, we will discuss: (1) A data driven strategy to incorporate limited experimental data into the stochastic analysis, (2) Effective computational strategies to solve the resulting stochastic partial differential equations in high-dimensional spaces and (3) A stochastic variational multiscale formulation to incorporate uncertain multiscale features.

A number of examples will be presented to demonstrate the potential and limitations of the various techniques discussed. These will include problems related to long-term integration and stochastic discontinuity.

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