# Stochastic Multiscale Modeling for Physical and Biological Problems

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Seminar Series

**Presented by…**

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**Abstract:** Stochastic modeling is required in many applications that involve multiscale phenomena, where information is lost as part of the coarse-graining procedure, e.g. formulating mesoscale dynamics equations from atomistic descriptions using the Mori-Zwanzig approach. It is also required in other systems with draconian approximations, e.g. spatial lumping, where effective parameters are employed to model some of the dynamics, and it can be in additive or multiplicative form. In many of these cases, the solution of the corresponding stochastic PDEs requires treating effectively problems in high dimensional spaces. In this talk, we will present effective new ways of dealing with this "curse-of-dimensionality" and we present demonstrative examples from fluid mechanics, electric networks, and biology.


**Bio:** George Karniadakis is a Professor of Applied Mathematics at Brown University and a visiting professor and senior lecturer on Ocean/Mechanical Engineering at MIT. His research interests include diverse topics in computational science both on algorithms and applications. A main current thrust is stochastic simulation (in the context of uncertainty quantification and beyond) and multiscale modeling of physical and biological systems. He is a Fellow in the Society for Industrial and Applied Mathematics, the American Physical Society, and the American Society of Mechanical Engineers; and an Associate Fellow in the American Institute of Aeronautics and Astronautics.

**More info:**

http://www.cfm.brown.edu/people/gk/

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