

University of Notre Dame Department of Mathematics

## PDE SEMINAR

**Richard Gejji**

University of Notre Dame

*Will give a lecture entitled:*

### **Connecting Stochastic Processes with PDE descriptions - The Derivation of the Transient Differential Chapman-Kolmogorov**

*On*

Monday, July 5, 2010

*At*

1:00 PM

*In*

258 Hurley Hall

#### ***Abstract***

PDE's can be analyzed to make predictions on a variety of models from stock markets to bacterial movement. However, it is not always obvious how we can get a PDE from a given stochastic process. With sufficient knowledge about how transitions between states occur, it is possible to use continuous limit methods, such as application of the Differential Chapman-Kolmogorov Equation (DCK), to derive a PDE whose solution approximates the unknown probability density function of the process being studied.

This talk will be on the generalized Transient Differential Chapman-Kolmogorov Equation (TDCK) which uses distribution theory to extend the DCK to apply to more general probability distributions and will allow the process to evolve on a subspace of measure less than or equal to 1. As motivation, an introduction to the classical derivation of the heat equation as the limit of random walks will be presented. This will be followed by the derivation of the TDCK.