1067-60-717 **Elife Dogan*** (elife.dogan@ttu.edu), Mathematics & Statistics, Texas Tech University, Lubbock, TX 79410, and **Edward J. Allen** (edward.allen@ttu.edu). *Derivation Of Stochastic Partial Differential Equations for Reaction-Diffusion Processes.*

Stochastic partial differential equations are derived for the reaction-diffusion process in one, two and three dimensions. Specifically, stochastic partial differential equations are derived for the random dynamics of particles that are reacting and diffusing in a medium. In the derivation, a discrete stochastic reaction-diffusion equation is first constructed from basic principles, i.e., from the changes that occur in a small time interval. As the time interval goes to zero, the discrete stochastic model leads to a system of Ito stochastic differential equation. As the spatial intervals approach zero, a stochastic partial differential equation is derived for the reaction-diffusion process. The stochastic reaction-diffusion equation can be solved computationally using numerical methods for systems of Ito stochastic differential equations. Comparisons between numerical solutions of stochastic reaction-diffusion equations and independently formulated Monte Carlo calculations support the accuracy of the derivations. (Received September 14, 2010)