Abstract:

In this talk I will discuss stochastic modeling approaches suitable to spatially extended biological processes. Selected motivating examples include wound healing processes, gradient sensing migrating cells, development of colon crypts, and quorum sensing mechanisms. I will also consider some of the intricacies of capturing cell-to-cell communication and being able to do so efficiently within a non-static population of cells. I will first briefly review some of our previous work in the reaction-diffusion master equation framework, suitable to highly resolved models of living cells. I will next consider the cell population instead and present a computational framework designed specifically for this application. The general computational challenge is to bridge the vast scale separation inherent with these types of applications, and results concerning multiscale convergence will therefore also be discussed. The final discussion will evolve around early results in Bayesian data-driven modeling within these types of framework.

CV:

Feb 2014–Present Associate professor at the Department of Information Technology, Uppsala University, Sweden.
Oct 2010–Jan 2014 Assistant professor (tenured) with research and with a teaching load of 25%. The position was placed under the Linnaeus center of excellence UPMARC, at the Department of Information Technology, Uppsala University, Uppsala.