Mind the Gap: Is Biomathematics Education Keeping up with Research?

Raina Robeva – Department of Mathematical Sciences, Sweet Briar College

Over the last decade, methods from modern algebra and discrete mathematics, including graph theory, Boolean networks, polynomial dynamical systems, hidden Markov models, Petri nets, Groebner bases, and more, have been used with great success for solving a wide range of biological problems. Examples span a spectrum of areas and applications: signaling networks and gene regulation; genome assembly; DNA, RNA and protein models and folding; neural networks and neural codes; biochemical reaction networks; cancer models; drug resistance and control; ecological networks and food webs, just to mention a few. The available literature is already massive and growing at a rapid pace, clearly showing that algebraic methods have become essential for mathematical biology. Relatively little progress has been made, however, in introducing those approaches to the mainstream undergraduate mathematical biology curriculum, even though for many of them the level of mathematical sophistication and the nature of the material are entirely appropriate. Thus, while some classical mathematical biology topics requiring difference equations, differential equations, and continuous dynamical systems have already successfully worked their way into classes and standard curriculum, discrete and algebraic techniques have remained relatively invisible. The talk will highlight some of those challenges and present ideas and curricular resources for bridging the gap.