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**Terrell L. Hodge\*** ([terrell.hodge@wmich.edu](mailto:terrell.hodge@wmich.edu)), Dean's Office, College of Arts and Sciences, 2304 Friedmann Hall, Western Michigan University, Kalamazoo, MI 49008-5308, and **Raina Robeva** ([robeva@sbcc.edu](mailto:robeva@sbcc.edu)), Department of Mathematical Sciences, Sweet Briar College, Sweet Briar, VA 24595. *Mathematical Concepts and Methods in Modern Biology: Using Modern Discrete Models - A Book in Progress.*

We describe a collaborative multi-author, crossdisciplinary book project elucidating frameworks that systematically analyze, predict and modulate the behaviors of complex biological systems using modern discrete models. After beginning with an important topic from biology, each chapter continues by laying out mathematical methods appropriate for addressing related questions. With an emphasis on modern molecular and systems biology, chapter topics include gene expression and regulation, neuronal networks, codon usage and CpG islands, phylogenetics and more. Mathematical methods include elementary discrete mathematics, computational algorithms, graph theory, probability, linear, polynomial, and abstract algebra, and more. Prominent toolkits in the life sciences, such as agent-based modeling (ABM), cluster analysis, and discrete dynamical systems are featured, and combined with significant new developments, e.g., an algebraic approach to ABM and optimal control in the life sciences via algebraic geometry. Exercises and projects embedded within each chapter support interaction with the models and computational methods through hands-on activities. Early sections are written at the undergrad level while later sections may facilitate connections with advanced topics or ongoing research. (Received September 22, 2011)