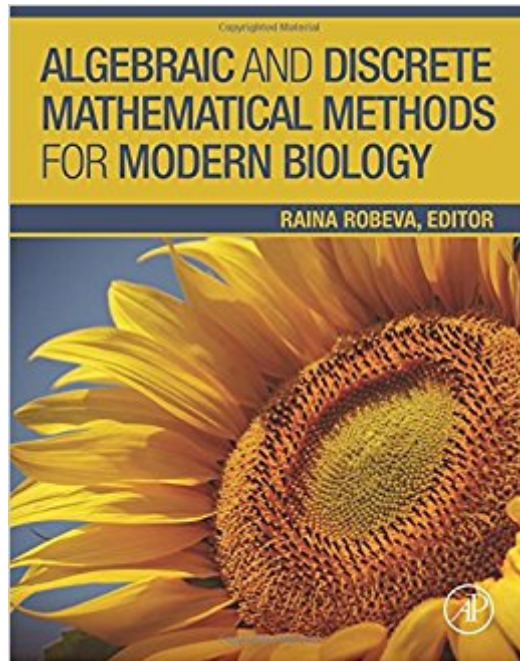




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# **Algebraic And Discrete Mathematical Methods For Modern Biology**



## Synopsis

Written by experts in both mathematics and biology, *Algebraic and Discrete Mathematical Methods for Modern Biology* offers a bridge between math and biology, providing a framework for simulating, analyzing, predicting, and modulating the behavior of complex biological systems. Each chapter begins with a question from modern biology, followed by the description of certain mathematical methods and theory appropriate in the search of answers. Every topic provides a fast-track pathway through the problem by presenting the biological foundation, covering the relevant mathematical theory, and highlighting connections between them. Many of the projects and exercises embedded in each chapter utilize specialized software, providing students with much-needed familiarity and experience with computing applications, critical components of the "modern biology" skill set. This book is appropriate for mathematics courses such as finite mathematics, discrete structures, linear algebra, abstract/modern algebra, graph theory, probability, bioinformatics, statistics, biostatistics, and modeling, as well as for biology courses such as genetics, cell and molecular biology, biochemistry, ecology, and evolution. Examines significant questions in modern biology and their mathematical treatments Presents important mathematical concepts and tools in the context of essential biology Features material of interest to students in both mathematics and biology Presents chapters in modular format so coverage need not follow the Table of Contents Introduces projects appropriate for undergraduate research Utilizes freely accessible software for visualization, simulation, and analysis in modern biology Requires no calculus as a prerequisite Provides a complete Solutions Manual Features a companion website with supplementary resources

## Book Information

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"...makes an important contribution to mathematical biology education. It brings to the reader important biological problems and novel mathematical approaches that are mostly not discussed in other undergraduate texts on the subject." --Society for Industrial and Applied Mathematics "The book will serve as an excellent resource for instructors in the overlap between biology, mathematics, and computing who are looking for interesting and well-worked-out examples that apply algebra to modern biological questions." --The Quarterly Review of Biology "This is an excellent book which would be suitable as a textbook...I therefore strongly recommend it, over other classic texts, for use in teaching Discrete Mathematics." --MAA.org

Inspired by the national initiative toward a "new biology," this work offers a collection of modules introducing methods from modern discrete mathematics into the undergraduate math and biology curricula. Each module begins with a question from contemporary biology, followed by the description of mathematical methods and theory appropriate for the search of answers. Projects and exercises embedded in the text utilize freely accessible or widely available software for visualization, simulation, and analysis used in modern biology research. This book is appropriate for mathematics courses such as finite mathematics, discrete structures, linear algebra, abstract/modern algebra, graph theory, probability, bioinformatics, statistics, biostatistics, and modeling, as well as for biology courses such as genetics, cell and molecular biology, biochemistry, ecology, and evolution. The companion website includes solutions to all exercises and additional materials including tutorials, projects, data sets, and computer code.

**Key Features**

- Examines significant questions in modern biology and their mathematical treatments
- Presents important concepts and methods from discrete mathematics in the context of essential biology
- Features material appropriate for both mathematics and biology courses
- Presents chapters in modular format so coverage does not need to follow the Table of Contents
- Introduces projects appropriate for undergraduate research
- Requires no calculus as a prerequisite.

Raina Robeva was born in Sofia, Bulgaria. She has a PhD in Mathematics from the University of Virginia and has led multiple NSF-funded curriculum development projects at the interface of mathematics and biology. She is the lead author of the textbook *An Invitation to Biomathematics* (2008) and the lead editor of the volume *Mathematical Concepts and Methods in Modern Biology: Using Modern Discrete Models* (2013), both published by Academic Press. Robeva is the founding Chief Editor of the research

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