

Preface

Welcome to the fascinating intersection of mathematics, biology, and ecology!

This book is intended primarily as a resource for teachers planning to teach their first introductory course on modeling in mathematical biology and/or ecology. This being said, it can also be used by students preparing to embark on an independent studies project in one of these fields; or, by researchers unfamiliar with the methods or software introduced who are seeking an accessible and quick introduction to one of the methods and/or software presented here; or, by curious biologists, ecologists, or mathematicians who may be unfamiliar with “the other side”; or, maybe, by the perpetual learner who is intrigued by the dynamics of living ecosystems. For each of the above, this book is designed to be an accessible introduction to the captivating landscape of biomathematics.

The approach used in this book takes advantage of technology in leading readers on a journey that bridges seemingly distinct fields through introductions to three methods and software platforms: compartmental models with Berkeley Madonna; agent-based models with NetLogo; and cluster analysis through self-organizing maps using an R Shiny app.

This is not intended to be a textbook (though it may be used as one), nor is it a purely mathematics book or one purely about deeper aspects of biology or ecology. It focuses on three selected ways in which the intersection of mathematics and biology (and mathematics and ecology) can be explored with the help of software. Moreover, the manner in which the content is presented makes it possible to use this book to help prepare for an introductory course at a wide range of levels, depending on the discipline within which the course is taught and the mathematical prerequisites for the course.

There are four chapters, the first of which presents the reader with a bit of background information followed by suggestions on how to get the most out of this book. The three core chapters introduce the three previously mentioned methods and software in a manner envisioned to be accessible to most.

