ECOLOGY | BIOLOGY

An accessible and wide-ranging introduction to the concepts and tools of theoretical ecology

Theoretical ecology explores the mechanisms that structure ecological communities using a variety of mathematical and computational tools. *Theoretical Ecology* shows you how to translate ecological problems into mechanistic models using both mathematics and the programming language R. The book teaches key concepts and core quantitative skills while also devoting significant attention to the reasons for building mathematical ecological models. Why do species populations fluctuate over time and space? How do multiple species coexist? What forces drive nutrient and carbon cycles? Does higher species diversity lead to higher biomass? Each chapter in this incisive and informative book is motivated by questions like these, and every chapter includes boxes that delve into mathematical details and provide coding examples in R.

- Focuses on mathematical and computational methods while also drawing on conceptual and graphical approaches, and explores how the various approaches complement one another
- Teaches students the skills they need to implement and analyze ecological models in R
- Covers topics ranging from single-species, competition, and predator–prey models to community ecology, island biogeography, and nutrient-flux models
- Provides exercises of gradated difficulty at the end of every chapter
- Ideal for advanced undergraduate and graduate classrooms and for independent study
- Includes a road map for class planning and self-study

RYAN CHISHOLM is associate professor in the Department of Biological Sciences at the National University of Singapore and a leading theoretical ecologist.

"Chisholm covers a range of topics and gives an accessible introduction to how to construct and analyze canonical models used in theoretical ecology. *Theoretical Ecology* will appeal to a very broad audience, from biology students with some exposure to mathematical reasoning to more mathematically experienced students who have some idea of basic ecological concepts but don't know how ecological models are constructed."
—EROL AKÇAY, UNIVERSITY OF PENNSYLVANIA

"Chisholm lays out a clear path to understanding the mathematical foundations of any area of theoretical ecology, which is really helpful both for students as well as teachers who might want to expand their teaching outside their own areas of expertise. It is a great resource for self-study."
—CLAY CRESSLER, UNIVERSITY OF NEBRASKA–LINCOLN

"This is a book you can read cover-to-cover to get a sense of what theoretical ecology is about and revisit to learn specific mathematical and computational methods. Using an accessible storytelling approach, Chisholm starts from basic principles to build each model and provides all the details you need to understand the mathematical analysis."
—FRÉDÉRIC GUICHARD, MCGILL UNIVERSITY

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