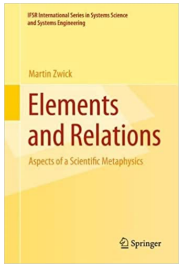
Elements and Relations: *Aspects of a Scientific Metaphysics*

By Martin Zwick



About the book

This book develops the core proposition that systems theory is an attempt to construct an "exact and scientific metaphysics," a system of general ideas central to science that can be expressed mathematically. Collectively, these ideas would constitute a nonreductionist "theory of everything" unlike what is being sought in physics. Inherently transdisciplinary, systems theory offers ideas and methods that are relevant to all of the sciences and also to professional fields such as systems engineering, public policy, business, and social work. To demonstrate the generality and importance of the systems project, the book structures its content in three parts: Essay, Notes, and Commentary. The Essay section is a short distillation of systems ideas that illuminate the problems that many types of systems face. Commentary explains systems thinking, its value, and its relation to mainstream scientific knowledge. It shows how systems ideas revise our understanding of science and how they impact our views on religion, politics, and history. Finally, Notes contains all the mathematics in the book, as well as scientific, philosophical, and poetic content that is accessible to readers without a strong mathematical background.

Elements and Relations is intended for researchers and students in the systems (complexity) field as well as related fields of social science modeling, systems biology and ecology, and cognitive science. It can be used as a textbook in systems courses at the undergraduate or graduate level and for STEM education. As much of the book does not require a background in mathematics, it is also suitable for general readers in the natural and social sciences as well as in the humanities, especially philosophy.

About the author

Martin Zwick is a Professor of Systems Science at Portland State University. His first position after his PhD in Biophysics from MIT was in the Department of Biophysics and Theoretical Biology at the University of Chicago where he continued mathematical and computational research on macromolecular structure. When his interests shifted to systems theory and methodology, he joined the faculty of the Systems Science Program and later served for a number of years as program head. Beyond his work in systems science as such, he has applied systems ideas and methods to a wide variety of topics in the natural and social sciences, computer science and engineering, biomedicine and health, and the humanities. For the breadth and depth of his scholarly work he was recognized with the university's award for research excellence. His recent interests have been in machine learning (especially probabilistic graphical modeling), theoretical biology and Artificial Life, and systems theory and philosophy. Scientifically, his focus is on applying systems theory and methodology to the sciences. Philosophically, his focus is on how systems ideas relate to classical and contemporary philosophy and how they help us understand and address societal problems.