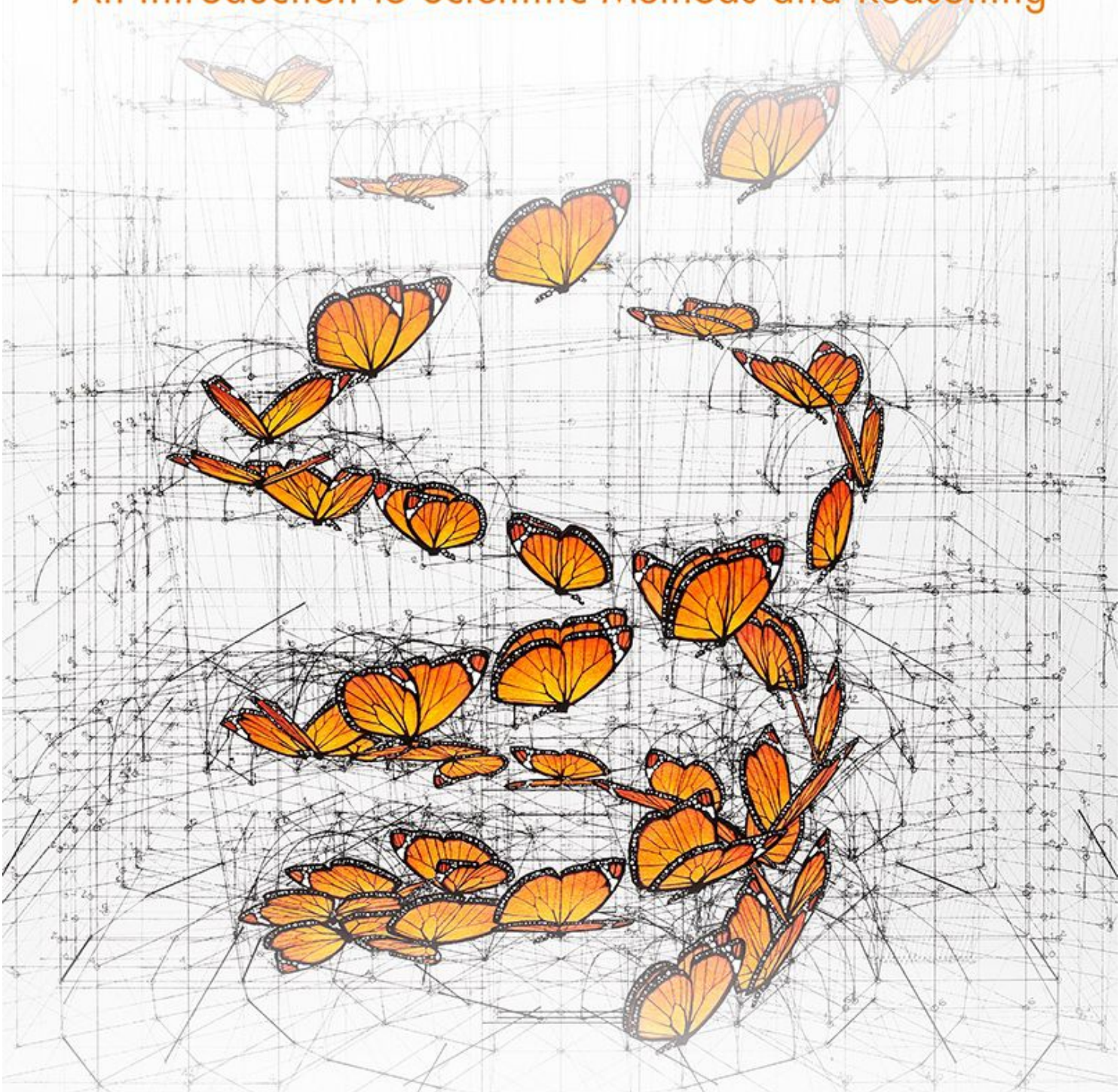
RECIPES FOR SCIENCE

An Introduction to Scientific Methods and Reasoning



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An Introduction to Scientific Methods and Reasoning

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Contents

Recipes for Science

There is widespread recognition at universities that a proper understanding of science is needed for all undergraduates. Good jobs are increasingly found in fields related to science, technology, engineering, and mathematics (STEM), and science now enters almost all aspects of our daily lives. For these reasons, scientific literacy and an understanding of scientific methodology are now a foundational part of any undergraduate education (and not just the education of science majors).

Recipes for Science provides an accessible introduction to the main concepts and methods of scientific reasoning. With the help of an array of contemporary and historical examples, definitions, visual aids, and exercises for active learning, the textbook helps to increase students' scientific literacy. The first part of the book covers the definitive features of science: naturalism, experimentation, modeling, and their merits and limitations. The second part covers the main forms of inference in science: deductive, inductive, abductive, probabilistic, statistical, and causal. The book concludes with a discussion of explanation, theorizing and theory-change, and the relationship between science and society. The textbook is designed to be adaptable to a wide variety of different kinds of courses. In any of these different uses, the book helps students better navigate our scientific, 21st-century world, and it lays the foundation for more advanced undergraduate coursework in a wide variety of liberal arts and science courses.

KEY FEATURES

- Helps students develop scientific literacy—an essential aspect of any undergraduate education in the 21st century, including a broad understanding of scientific reasoning, methods, and concepts
- Is written for all beginning college students—preparing science majors for more focused work in a particular science, introducing the humanities' investigations of science, and helping non-science majors become more sophisticated users of scientific information
- Provides an abundance of both contemporary and historical examples of science
- Covers reasoning strategies and norms applicable in all fields of physical, life, and social sciences, as well as strategies and norms distinctive of specific sciences
- Includes visual aids to clarify and illustrate ideas
- Provides text boxes with related topics and a final glossary with helpful definitions of key terms

- Includes exercises for active learning at the end of each section to ensure full student engagement and mastery of the content
- Provides annotated 'For Further Reading' sections at the end of each chapter, guiding students and instructors to the best primary and secondary sources available
- Offers a continually developing e-resource, with author-developed and crowdsourced materials, including
    - syllabi for a variety of courses using this textbook
    - bibliography of additional resources, including online materials
    - sharable PowerPoint presentations and lecture notes
    - ideas for additional exercises and extended projects

Angela Potochnik is Associate Professor of Philosophy and Director of a new center for public engagement with science at the University of Cincinnati. She earned her PhD in philosophy at Stanford University in 2007. Her research addresses the nature of science and its successes, the relationships between science and the public, and methods in population biology. She is the author of *Idealization and the Aims of Science* (2017).

Matteo Colombo is Assistant Professor in the Tilburg Center for Logic, Ethics, and Philosophy of Science, and in the Department of Philosophy at Tilburg University. His published work is mostly in the philosophy of cognitive science, philosophy of science, and moral psychology. He is interested in questions about evidence and explanation in the computational, cognitive, and brain sciences and more generally in how the scientific and manifest images of mind relate to one another.

Cory Wright is Professor of Philosophy and Director of Graduate Studies at California State University Long Beach. His scholarship primarily concerns the nature and norms of explanation and judgment, and he is the co-editor of *New Waves in Truth* (2010) and *Truth and Pluralism: Current Debates* (2013), along with other published works in the life and cognitive sciences. He was a postdoctoral McDonnell Fellow in the Philosophy-Neuroscience-Psychology program at Washington University in St. Louis and earned his doctorate in philosophy and cognitive science from University of California, San Diego.