

Preface

This book represents a consolidation of lectures given by one of the authors over a 25-year period. It is intended for students who wish to apply stochastic processes to their own field.

Our goal is to use an informal, simple, and accessible style to introduce all basic types of these processes. Most of our examples are supplemented by MAPLE programs (MAPLE's syntax resembles pseudocode and can easily be adapted to other systems), including Monte Carlo simulations of each particular process. This enables the reader to better relate to the corresponding theoretical issues.

The classic texts in this subject area are too dated to utilize modern computer-algebra systems to, for instance, manipulate generating functions or build numerical rather than analytic solutions. Consequently, these techniques have been ignored historically because they were totally impractical when working strictly by hand. Since computers are now pervasive, fully integrating their usage into our text is a major contribution of the book. In fact, this, combined with our belief that overemphasizing mathematical details makes the material inaccessible to students, was our motivation.

In our writing we strive to satisfy three simple criteria: readability, accessibility, and brevity. To be *readable* we write informally, encouraging the reader to ask meaningful questions first and then systematically resolve them, one by one. In this way, our narrative should be confluent and fluid, so that reading the book cover to cover is not only possible but, hopefully, enjoyable.

To be *accessible*, we use ample examples throughout, accompanying each new notion or result with a specific illustration of some real-world application. Many of these are MAPLE simulations of the corresponding process, illustrating its main features.

We also delegate to MAPLE the derivation of some formulas, demonstrating its usefulness for algebraic manipulation. At the same time, we try to be as rigorous as possible, formally proving practically all our assertions. We usually do so verbally, thereby avoiding complex mathematical notation whenever possible.

Similarly, we have been careful not to assume much mathematical knowledge—whenever a new technique or concept is needed, an introduction to the corresponding mathematical background is provided.

Finally, *brevity* was a natural consequence of our goal to be concise. It was important to us to provide a framework for designing a two-semester course.¹ A book of fewer than 300 pages certainly fits this criterion.

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¹ Lecturers designing one- or two-semester courses should be aware that Chaps. 4, 5, 10, and 11 are self-contained, whereas Chaps. 2–3 and Chaps. 6–9 constitute a natural sequence.

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