

Preface to the Second Edition

The first part of this book concerns classical stochastic models and the second part concerns spatial stochastic models. For this second edition, the classical part of the book has been completely rewritten. The most important models, such as random walks, branching processes, and the Poisson process, are treated in separate chapters. For both discrete and continuous time models, we first study interesting examples and then we look at the general theory. Another important difference with the first edition is that most models are applied to population biology questions. We use stochastic models to test theoretical biology questions such as “Can the immune system be overcome by a fast mutating virus?” or “How far away is the next influenza pandemic?”

The second part of the book has been updated and streamlined. We cover the same spatial models as in the first edition. It is a small introduction to spatial stochastic models. We show that interesting results can be obtained with relatively elementary mathematics.

We also have added a first chapter that reviews important probability tools. The reader, however, is supposed to have had a first probability course. Many computations require solid Calculus (series in particular) and some proofs require knowing classical analysis. The appendix covers a few advanced probability results that are needed for the spatial models part. I have tried to make the chapters as independent as possible. At the beginning of each new chapter, there are some words about what is needed from previous chapters.

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