Review commissioned by: Math Reviews

Iosifescu, Marius; Limnios, Nikolaos; Oprisan, Gheorghe: Modèles stochastiques. Hermes Science - Lavoisier, Hermes Science (collection méthodes stochastiques appliquées), Paris 2007, 332 pp., EUR 120.00, ISBN 978-2-7462-1611-2.

Twenty-five years ago M. Iosifescu, S. Grigorescu, Gh. Oprisan and Gh. Popescu edited a collection of survey papers *Elemente de modelare stohastică* [in Romanian; *Elements of stochastic Modelling*, MR0784798 (86m:60001)] on stochastic models. The six articles covered a wide and (then) up-to-date range of stochastic models for real world phenomena; the exposition was deliberately non-technical and the authors had the non-specialist in mind, the (mathematical) novice or the scientist with some mathematical background. Unfortunately, this collection only appeared in Romanian.

The present book by two of the original authors and N. Limnios is, in some sense, a second edition of the 1984 monograph. Aim and scope are still the same: to provide an overview over important classes of stochastic processes and models in the sciences without too much emphasis on technicalities. The choice of the material has been substantially modified and more recent developments have been included; this is most obvious in the chapters on branching processes and, of course, the bibliography comprising more than 400 entries.

The book starts with a brief survey on stochastic processes in discrete and continuous time. Most of the material is standard; no proofs nor references are included here, but it is a valuable starting point for all readers who have not been exposed to such material earlier on. The subsequent chapters explore various models with some emphasis on Markovian (i.e. memoryless) and semi-Markovian processes. Chapter 2 is on elementary stochastic processes, the urn model, random walks, Brownian motion, Poisson models and birth-and-death processes. Markov chains in physics (the Ehrenfest model), genetics, storage models and reliability theory are covered in the third chapter. Chapters 4 and 5 are devoted to renewal theory, queueing, regenerative processes both in a Markov and a semi-Markov context. Branching processes, mainly the Bienaymé-Galton-Watson model and some of its generalisations are covered in Chapter 6. Optimal stopping is very briefly described in the last chapter.

All sections can be read almost independently and each of them gives an easily accessible account of the models and the relevant stochastic processes. Some subjects are dealt with in detail whereas others are only briefly touched. Everyone writing such a survey faces the problem to navigate between Skylla – that is: too much emphasis is put on details and on the latest results with all the heavy machinery – and Charybdis – that is: lack of precision and mathematical rigour. The authors managed to find the right way, including precise statements and only those proofs which are actually helpful to the reader and where insight into the model or the probabilistic method is gained; for all other proofs which would be too difficult or counter-intuitive proper references are given. Despite the large number of different topics, this text is a lot more than a mere juxtaposition of different material: most results are commented, embedded in their historical context and nicely motivated.

The book is a stimulating read and will help both the expert and the novice to get a comprehensive overview of the subject.

MSC2000 Primary: 60-01; Secondary: 60G35; 60G42; 60J05; 60J10; 60J20; 60J25; 60J27; 60J65; 60J80; 60K05; 60K25; 60K20.