

Reiss, R.-D.

A course on point processes. (English) Zbl 0771.60037
Springer Series in Statistics. New York: Springer-Verlag, xi, 253 p. (1993).

This book is an introduction into various aspects of the theory of random point processes where much space is devoted to the statistical view toward this type of processes, in particular to the specification of densities and models of point processes. Modeling of special classes of point processes in general, finite-dimensional discrete state spaces is discussed in connection with such topics as truncation and thinning of empirical processes, univariate and multivariate point processes of exceedances, point processes in discrete spaces that are of interest in survey sampling or image restoration, the Gibbsian description of point processes via conditional distributions, and the specification of stochastic intensity processes. Binomial, Poisson, and Coxian point processes play a central role. Large parts of the book are concerned with the asymptotic theory for point processes where the main emphasis is put on convergence with respect to the variational and Hellinger distances. In connection with this, the Poisson approximation of models of empirical processes is studied in detail. The weak convergence of point processes is also considered.

The book is divided into three parts. In the first part, motivation, notation and basic concepts of the theories of point processes and of strong approximation are given. Examples of point-process models are considered, and the notions of multivariate point processes, marked point processes, and thinning and weighing of point processes are introduced. Densities of Poisson, empirical, and Cox processes with respect to another point process of the same type are calculated. The second part is concerned with such topics as the nonparametric estimation of intensity functions and regression functions, with some questions of sampling from finite populations formulated in terms of point processes, and with extreme value models. Some problems of stochastic geometry and spatial statistics are discussed as well. The notions of moment measures, Campbell measures, and Palm distributions of point processes are briefly dealt with. In the third part, besides weak convergence, martingale techniques for point processes on the nonnegative halfline are considered.

The book is designed for lecturers and graduate students in probability and statistics. Each chapter ends with a section containing exercises and supplements. The book has a bibliography with 160 items, an author index and a subject index.

Reviewer: [V.Schmidt \(Ulm\)](#)

MSC:

- [60G55](#) Point processes (e.g., Poisson, Cox, Hawkes processes)
- [60-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to probability theory
- [60G70](#) Extreme value theory; extremal stochastic processes
- [62-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to statistics

Cited in 1 Review
Cited in 77 Documents

Keywords:

[random point processes](#); [statistical view](#); [thinning of empirical processes](#); [Coxian point processes](#); [Hellinger distances](#); [convergence of point processes](#); [extreme value models](#); [martingale techniques for point processes](#)