

Dynamical Biostatistical Models presents statistical models and methods for the analysis of longitudinal data. The book focuses on models for analyzing repeated measures of quantitative and qualitative variables and events history, including survival and multistate models. Most of the advanced methods, such as multistate and joint models, can be applied using SAS or R software.

The book describes advanced regression models that include the time dimension, such as mixed-effect models, survival models, multistate models, and joint models for repeated measures and time-to-event data. It also explores the possibility of unifying these models through a stochastic process point of view and introduces the dynamic approach to causal inference.

Drawing on much of their own extensive research, the authors use three main examples throughout the text to illustrate epidemiological questions and methodological issues. You will see how each method is applied to real data and how to interpret the results.

Features

- Progresses from simple methods, such as standard repeated measures and survival analysis, to advanced ones, such as multistate and joint models
- Links the dynamical approach to causality and mechanistic models, enabling the unification of dynamical models, the formalization of causal interpretations, and the connection between mechanistic and more descriptive models
- Offers an introduction to statistical inference, including important results of maximum likelihood theory, model selection, and the main optimization algorithms
- Includes detailed examples taken from brain aging, HIV infection, and cancer studies, allowing you to see how the models answer real epidemiological questions
- Describes how to implement the models and analyze the examples using SAS and R



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6000 Broken Sound Parkway, NW
Suite 300, Boca Raton, FL 33487
711 Third Avenue
New York, NY 10017
2 Park Square, Milton Park
Abingdon, Oxon OX14 4RN, UK

