consequence. It seems a pity that trends seasonality and time series regression are not all viewed in the light of spectrum theory. The latter is mentioned in sections 50.39, 5.40 with several *faux pas* and without any insights. Forecasting is only briefly treated although it is a subject that the authors could have done very well and that badly needs a sensible discussion. But by then the end was in sight and the endurance of K. and S., though colossal, is bounded. We have every reason to be very grateful for their labors and to wish them a well earned rest!

Viewing the whole ambitious project in retrospect, one can see that it *does* review the whole subject in the spirit and with the methods of about 1955. Of course many of the details and references go up to about 1967, provided they fit into the earlier schema. Given that the subject has its ephemeral fads, this is not such a bad thing. Naturally no encyclopaedic work can be "up to date." Of course the fact that methods and ideas have endured for twenty years is no guarantee of immortality in our subject—although as a student in 1950 it seemed quite likely!

Most textbooks nowadays have a very careful development but they are inclined to stick too narrowly to their title so that the fertilizing cross-connections between different topics are not mentioned. Unless one studies them from page one onwards, they are inclined to be very hard to dip into. Moreover there are very few happy turns of phrase to indicate that they are written by fallible human beings about a subject with shaky foundations. On these three counts, K. and S. is virtually unique. Although very different, Feller's Volume 1 comes to mind in this connection.

I can only see a 1970 encyclopaedia arising as a joint effort of many authors with someone like Keifer as Editor. Whether the contributors could be persuaded to write for the common man and not their peers would be his main task. But doctrinal difficulties would surely defeat the project now. I will resist drawing out the humourous aspects one can see in such a project.

In conclusion while K. and S. is not the ultimate authority on each topic, it is an invaluable mine of formulae, facts and commentary and will not have a competitor for a long time to come.

CHIANG, CHIN LONG. *Introduction to Stochastic Processes in Biostatistics*. Wiley, New York, 1968. xvi+313 pp. $13.96.

Review by PETER BROCKWELL
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This book is divided into two parts. Part 1 contains a review of the basic probability theory needed later in the book, a chapter on probability generating functions, and six chapters devoted to solutions of the Kolmogorov differential equations for a variety of continuous-time Markov chains. Two of these chapters are devoted to illness-death processes and a third allows for the additional complications of immigration and emigration. Part 2 deals with the construction of life-tables from empirical data with particular emphasis on the estimation of survival probabilities and life expectancies. The author's life-table techniques are then developed and applied to the analysis of mortality data classified by cause of death. The aim here is to estimate such quantities as the increases in survival probabilities and life-expectancies which would be achieved by the elimination of a particular disease. The last chapter shows how the methods can also be applied to the statistical analysis of medical follow-up studies.

The book will be primarily of interest to demographers, biostatisticians and those who are interested in the applications rather than the general theory of stochastic processes. In fact the treatment is almost exclusively confined to continuous time Markov chains and the emphasis is on finding explicit solutions for the Kolmogorov differential equations. The solution $P(t) = e^{Vt}$ for the transition matrix of a homogeneous finite state-space Markov chain with infinitesimal generator V is given in Chapter 6. The evaluation of e^{Vt} is discussed only when V has real distinct eigenvalues ρ_i, $i = 1, \ldots, n$, in which case the author expresses the transition probabilities $P_{ij}(t)$ in terms of cofactors of the matrices $(\rho_i I - V)$, $i = 1, \ldots, n$, where I is the $n \times n$ identity matrix. The assumption of real distinct eigenvalues is very strong however and a more general discussion of e^{Vt} is needed. The fact that irreducibility of the chain implies ergodicity (i.e. $\lim_{t\to\infty} P_{ij}(t)$

exists and is independent of i) is not mentioned while the sufficient condition for ergodicity given in Chapter 6, that V have real distinct eigenvalues, is not very useful. Most of Part 1 is devoted to homogeneous Markov chains but a number of non-homogeneous processes are also considered. The reader who works through the material will become familiar with a variety of techniques for solving Kolmogorov differential equations. Some of the topics examined, for example the specific applications to illness-death processes and the consideration of multiple transition probabilities are not to be found in other texts. The very detailed presentation makes the book accessible to those with a limited mathematical background; however for a more mathematical reader the copious detail sometimes obscures rather than illuminates the argument.

The second part of the book gives an interesting account of some practical demographic problems based on Professor Chiang's research in the field of life-tables, competing risks and medical follow-up studies. It is to a large extent independent of the first part of the book although some familiarity with the pure death process is required. The theory is clearly presented and well illustrated with data collected from a variety of sources.

The book contains very few misprints. Each chapter is followed by problems which for the most part are straightforward applications or extensions of the text. For those with a special interest in life-tables and their ramifications, in mathematical models for illness and death, or in other problems (for example reliability studies) which can be couched in these terms, this book provides a gentle and detailed introduction to the underlying continuous-time Markov processes. The main shortcoming of the book is that its scope is much narrower than the title suggests.