Preface to the First Edition

Sequencing and scheduling is a form of decision-making that plays a crucial role in manufacturing and service industries. In the current competitive environment effective sequencing and scheduling has become a necessity for survival in the marketplace. Companies have to meet shipping dates that have been committed to customers, as failure to do so may result in a significant loss of goodwill. They also have to schedule activities in such a way as to use the resources available in an efficient manner.

Scheduling began to be taken seriously in manufacturing at the beginning of this century with the work of Henry Gantt and other pioneers. However, it took many years for the first scheduling publications to appear in the industrial engineering and operations research literature. Some of the first publications appeared in *Naval Research Logistics Quarterly* in the early 1950s and contained results by W.E. Smith, S.M. Johnson, and J.R. Jackson. During the 1960s a significant amount of work was done on dynamic programming and integer programming formulations of scheduling problems. After Richard Karp's famous paper on complexity theory, the research in the 1970s focused mainly on the complexity hierarchy of scheduling problems. In the 1980s several different directions were pursued in academia and industry with an increasing amount of attention paid to stochastic

scheduling problems. Also, as personal computers started to permeate manufacturing facilities, scheduling systems were being developed for the generation of usable schedules in practice. This system design and development was, and is, being done by computer scientists, operations researchers and industrial engineers.

This book is the result of the development of courses in scheduling theory and applications at Columbia University. The book deals primarily with machine scheduling models. The first part covers deterministic models and the second part stochastic models. The third and final part deals with applications. In this last part scheduling problems in practice are discussed and the relevance of the theory to the real world is examined. From this examination it becomes clear that the advances in scheduling theory have had only a limited impact on scheduling problems in practice. Hopefully there will be, in a couple of years, a second edition in which the applications part will be expanded, showing a stronger connection with the more theoretical parts of the text.

This book has benefited from careful reading by numerous people. Reha Uzsoy and Alan Scheller Wolf went through the manuscript with a fine-tooth comb. Len Adler, Sid Browne, Xiuli Chao, Paul Glasserman, Chung-Yee Lee, Young-Hoon Lee, Joseph Leung, Elizabeth Leventhal, Rajesh Sah, Paul Shapiro, Jim Thompson, Barry Wolf, and the hundreds of students who had to take the (required) scheduling courses at Columbia provided many helpful comments that improved the manuscript.

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