Book Selection

Edited by U Aickelin

M Pinedo: Planning and Scheduling in Manufacturing and Services (Springer Series in Operations Research)
D Comer: The Internet Book: Everything You Need to Know About Computer Networking and How the
Internet Works (Paperback)
JN Hooker: Integrated Methods for Optimization (International Series in Operations Research & Management Science)
(Hardcover)
JL Jain: A Course on Queueing Models (Hardcover)

Planning and Scheduling in Manufacturing and Services (Springer Series in Operations Research)

M Pinedo

Springer-Verlag, 2005. 522pp. £46.00
ISBN: 0387221980

Planning and Scheduling in Manufacturing and Services not only is written in a simple and clear manner, but also offers a scholarly presentation of planning and scheduling problems, models, solutions methods and systems. Pinedo's book is an effective combination of planning and scheduling theory with practical applications which help the reader to immediately link mathematical models to real-world problems and computer-based decision support systems.

The book is organized in a way that facilitates a progressive introduction to the fascinating topic of planning and scheduling. There are four parts and six appendices in addition to a CD-ROM containing additional resources.

Part I gives an introduction to problems, notation and models of planning and scheduling problems. Parts II and III are dedicated to detailed presentations of important problems in the manufacturing and services industries, respectively. Each part is made of several chapters and each chapter is dedicated to problems in a particular area covering their detailed description, formulation, applications and illustration with a real-world example. Part IV is somehow a distinctive feature in Pinedo's book because it gives a nice presentation of important issues to consider when designing and developing computerized planning and scheduling systems. Practitioners and those interested in developing computerized scheduling systems will find the three chapters in Part IV very useful. Based on his experience with real-world scheduling systems, Pinedo gives many insights into the important aspects that must be considered when developing this type of applications and those issues that still require further research and development.

The appendices offer readers an overview of solution methods including mathematical programming, heuristics and constraint programming. The appendices do not go into much depth but give a reasonable overview of each topic.

The last appendix is a short user's manual for the Lekin System, a machine scheduling system included in the CD-ROM. The book's website has a handful of useful resources including updated OPL models that are compatible with ILOG CPLEX versions released after the publication of this book.

Part I of the book is very effective in setting the scope and importance of planning and scheduling by using several illustrative examples of problems in this area. The book gives also a clear idea of the way in which such problems are embedded into the complex decision-making process in manufacturing and services. Parts II and III offer a rich collection of planning and scheduling problems clearly described and formulated without employing complicated notation (readers interested in a more mathematical-oriented approach should see alternative books). The similarities and differences between planning and scheduling problems arising in manufacturing and those arising in services are covered in good detail in this book helping the reader to appreciate the peculiarities and significance of the various models presented. At the end of each chapter the reader will find a series of interesting exercises that represent a nice combination of theory and practice which help the reader to assimilate concepts more effectively. Also at the end of each chapter, Pinedo gives 'Comments and References' which is basically a paragraph or two that concentrate a number of references to scientific papers relevant to each of the topics presented in the chapter. This is a very nice feature of this book because the interested reader can quickly identify at the end of each chapter, additional scientific reading for a particular topic.

Planning and Scheduling in Manufacturing and Services gives a progressive presentation of algorithms for planning and scheduling in starting with the CPM and PERT techniques. The author discusses not only the suitability of these approaches but also their limitation prompting the reader's interest for the more elaborate and robust solution techniques discussed in later chapters. Also in a progressive manner, the book introduces models and formulations and discusses the difficulty to formulate important constraints and subjective

criteria that exist in some real-world planning and scheduling problems. Solution approaches are also presented progressively starting with a textual description of the underlying logic, followed by the corresponding pseudocode and finally reinforced with a worked example offering the reader several ways to understand the given approach. Also, the differences and similarities between problems in planning and problems in scheduling are clearly explained in Chapter 8 in which the topic is supply chains. Also in each chapter, the book describes a real-world scenario, in many cases involving well-known global companies, in which a problem is modelled and solved using some kind of computer-based system.

The organization and presentation of this book makes an enjoyable read but this might also represent a small disadvantage for some readers. The reason for this is that in general, chapters in the book should be read sequentially because material presented in each chapter, including the appendices, makes a reference to material presented earlier in the book. Another observation is that some chapters do not provide the same elements as the rest of the book. For example, Chapter 9 would benefit from some kind of formulation of the timetabling problem discussed (even an incomplete model would help if a full one is not possible due to confidentiality). Also, Chapter 12, dedicated to workforce scheduling, does not include the description of a computerized application as is the case of other chapters.

Overall, Planning and Scheduling in Manufacturing and Services is a valuable resource for students, academics and practitioners interested in planning and scheduling. In this book, Pinedo gives a comprehensive presentation of problems, models and solution approaches for planning and scheduling problems in two important sectors: manufacturing and services. This book is a very effective combination of theory and practice presented in a simple and clear style making it very enjoyable reading.

University of Nottingham   D Silva

The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works (Paperback)

D Comer

Prentice Hall, 2006. 416pp. £28.99
ISBN: 0132335530

This could be an excellent book for libraries, academics, students and professionals as it is well written and pragmatically explained apart from the points I have quoted below. However, for Indian IT/Management students to explore this book it would require a drastic customization by incorporating relevant case studies. If this could be done, the sales of this book could be huge, especially for layman students in the field of Computer and Management in a country like India, Bangladesh, Sri Lanka and other Asian countries, which is going to become a hub for Low Price Editions.

The content inside the book is very well explained and knowledgeable. It has been observed from the book that the author endeavours to explain to the readers about Internet fundamentals. It has also been taken into consideration and observed that the contents are extremely well written and require a precise approach. Students may at times become confused as there seems to be a lot of resources, thus giving the impression that the book is more like a reference book rather than a textbook. This book is ideal for those people who want to understand the Internet concept and offers great help to Internet beginners.

As the author is well known in the field of Computer Science and has devoted many years in the research of Internet and related areas in systems, being a member of the Internet Architecture Board, the group which was responsible for guiding the Internet development. The initial chapter of the book 'The internet has arrived' has contributed a lot in this respect as he explains very well about the usage of Internet and giving a picture that Internet usage is not confined to a certain class of person but is for everyone's use.

It has been quoted in the preface that the book is designed for readers who do not have a strong technical background. Keeping this in mind, the unique selling point of this book is to initially explain the terminology and concepts needed to understand all the services. Instead of using mathematical algorithms or computer programs, the book uses analogies for everyday life to explain technology. Another selling point of the book is that elucidation is pragmatically explained. For example, take the example of LAN mentioned in page 52 of the book, which is a brilliant example. Another example is on page 51 which intelligently distinguishes between a hub and a switch.

One downside of the book is that the chapters are full of resources but lack homogeneity. For example Chapter 2 has a summary and Chapter 3 and other chapters in the book ignore this heading. I think it would have been better if every chapter used the same approach.

Indira Gandhi National
Open University   S Kesharwani

Integrated Methods for Optimization (International Series in Operations Research & Management Science) (Hardcover)

JN Hooker

Springer-Verlag New York Inc., 2006. 500pp. £54.00
ISBN: 0387382720

This is a very carefully written and interesting book. The author takes as his starting point the relatively recently created

opportunity to bring together mathematical programming methods of optimization and constraint (logic) programming. These two subjects had developed separately but now that the possibility exists for combining their power, as evidenced in developments in optimization software at the commercial level, the time is appropriate for considering in detail hybrid approaches to optimization which draw on mathematical and constraint programming.

The book is divided into three long chapters—'search', 'inference' and 'relaxation'. After an introductory chapter which makes interesting points about the improvements, in orders of magnitude, of computational power of optimization, the author proposes that the reader concentrates on chapter two, search. The other chapters are to be treated as elaborations of chapter two. A key idea that influences chapter two is Hooker's concept of a metaconstraint, which is a much more general construct than a typical mathematical programming constraint but which can be turned into a more familiar constraint, or set of constraints as required.

The chapter on 'search' is much more general than might be expected in a book on integer programming, say, because it develops not just 0-1 models, but more general integer programming models. It is surprising what can now be attained with such models—including formulation power as well as relaxation and solution. Hitherto much analysis of structures of general integer programming models was limited to a few grudging extensions of ideas from 0-1 models, but now the author is able to go much further. Also in this chapter cuts aiding searches are introduced and the idea of 'no-goods'. The searches are not just of an exact nature, there is material on local search, including useful material on how to limit searches.

In the 'inference' chapter there is much emphasis on duality and duals, a strength of the book. Constraints are developed in this chapter as a 'menu' of constraints which will later be summarized in Chapter 5. Typical constraint types are all diff, cardinality and so on, and the reader is usefully provided with (i) notation (ii) usage (iii) inference (iv) relaxation and (v) related constraints corresponding to each type of metaconstraint.

In the 'relaxation' chapter the difference is outlined between continuous relaxation and direct relaxation. Later different types of duals, such as the relaxation dual, are integrated with the work on relaxation. There are some useful descriptions of how to obtain 0-1 linear inequalities (cuts) and plenty of detail on generating relaxations of either/or formulations. The chapter also includes some sections on non-linear modelling.

The book concludes with a detailed listing of 39 different metaconstraint types and then there follows an extensive bibliography.

The book is meticulously presented by the author. It is not a light read, but because many sections can be read and studied in relative isolation from the rest of the book the goal of achieving understanding is made more manageable. Much of the material brought together in this comprehensive book is the author's own, but it is clear that he has gone much further than that which appeared in some of these earlier papers. Hooker has usefully captured the context-setting approach which he is able to achieve in his conference presentations with the formal rigour of the book format to provide some exceptional explanations of deep and difficult concepts. The book has been carefully proof-read and flows well. Although the book has been written in some senses as an advanced text book at PhD level, with exercises included, OR practitioners of optimization and all interested in modelling and solving structured deterministic problems will enjoy this book.

Loughborough University
Business School   JM Wilson

A Course on Queueing Models (Hardcover)

JL Jain

Taking as their context the growing interest in queuing theory in diverse fields such as management science and communication, the author states that the three main aims in writing this book are as follows: to include recent advances in the field of queuing theory, to include different methodological tools for studying queues, and, most importantly, to include computational techniques for the purpose of application. To a large extent, I think there has been success in meeting these aims.

The author begins with a study of Markovian queues and then moves on to regenerative non-Markovian queues, such as M/G/1 and G/M/1. This is followed by a study of more general queues such as G/G/1. Interspersed within this general structure are two chapters on computational methods and a chapter on the estimation and simulation of queues. Discrete-time queues and a range of miscellaneous topics are also treated.

The order in which material is covered is governed by the degree of difficulty and complexity of the mathematical methods covered, rather than on the similarity between the models treated, although, of course, these two factors often go hand in hand. For example, open Jackson networks of queues are covered in the chapter on Markovian queues, but closed Jackson networks, because of their greater computational complexity, are covered later. Similarly, the optimal design and control of queues are treated in more than one section, as are methods for the transient solution of queuing models.

A nice feature of the book is the Discussion section appearing at the end of each chapter. These sections give a balanced overview of the material covered and also make

connections with material covered in other parts of the book. In a similar vein, many of the mathematical methods are amplified with less formal remarks and discussion.

Recent advances covered include the application of combinatorial methods to queuing problems, the transient analysis of queues, various discrete-time queues and the optimal control of queues. These topics give the reader an insight into some of the more important recent developments in queuing theory.

Who should read this book? One of the stated aims refers to the application of queuing theory, and in several places the author mentions problems faced by practitioners. In this connection, those whose job it is to solve practical queuing problems will find this an excellent and well-documented source of general solution methods. The chapters on exact computational approaches are particularly useful. If I have a small gripe it would be the lack of any in-depth coverage, apart from diffusion approximations, of the many approximation methods and heuristic approaches that are available for tackling problems that are considered to be computationally intractable. But perhaps I am being rather greedy as the book is certainly thorough and wide-ranging in its coverage.

The reference to a 'Course' in the title suggests that the principal aim of the author is educational although this is not stated explicitly, apart from a reference to the book as being a textbook. The type of student addressed is not specified. Given the relatively advanced nature of the mathematics used, in my opinion the book would be most useful for courses at the final-year undergraduate level and graduate level, for students of Mathematics, OR, Engineering and related subjects. The large number of exercises at the end of each chapter is also a useful feature. Given the clarity of exposition and the careful organization of the book, I would certainly recommend it for student use. It would also be a useful reference source for researchers.

University of North London   B Atkinson