Modelling and Simulation: Annotated Booklist

Modelling with Generalized Stochastic Petri Nets
M. Ajmone Marsan, G. Balbo, G. Conte, S. Donatelli and G. Franceschinis, Wiley, 1995.
(JCML QA 76.9.D5 Mar. **reserved**)

This is a very good book—the essential *reference for GSPN modelling. The early chapters of the book cover basic Petri nets, extensions to nets with timing and nets with priority, and then GSPNs. Later chapters concentrate on particular application areas such as Manufacturing Systems, Communication Systems and Concurrent Programs.*

Probability, Statistics, and Queueing Theory with Computer Science Applications (Second Edition)
A.O. Allen, Academic Press 1990.
(JCML QA 273 All.)

This is quite a good book although it suffers from numerous typos. It goes at quite a gentle pace, and uses lots of examples, many of them humourously presented. As the title suggests it covers probability theory and queueing theory. Although Markov processes are discussed, it is only really as a stepping stone to queueing models. Much of the material in the book is beyond the scope of this course. The third part of the book is about statistical inference–a topic we won't cover at all.

Performance Modelling of Communication Networks and Computer Architectures
P.G. Harrison and N.M. Patel, Addison-Wesley, 1993.
(unfortunately no longer in print but the JCML has several copies: TK 5105.5 Har)

This book is a detailed textbook on performance modelling using queueing networks and it covers many sophisticated techniques which are beyond the scope of this course. The introductory chapters present a rigourous development of much of the same material as the first part of the course.

The Art of Computer Systems Performance Analysis
R. Jain, John Wiley, 1991.
(JCML QA 76.9.E94 Jai.**reserved and short loan**)

This book is primarily aimed at computer professionals who may need to know about performance analysis. It provides concise and clear introductions to many topics without going into them in depth. These topics include measurement, monitoring, workload characterisation, simulation, queues and queueing networks, and the operational laws—many of the topics we will cover in the course. I did not recommend it as the course text because the treatment is often superficial, it does not address Markovian analysis at all and only discusses simulation in a very abstract way, and also because it is expensive.

Computer and Communication Systems Performance Modelling
P.J.B. King, Prentice Hall, 1990.
(JCML QA 76.9.E94 Kin.)

This is book is intended to be similar in outlook to Harrison and Patel and so also mostly covers material which is beyond the scope of this course. It has quite a terse style and not many examples: this makes it good for looking things up in if you want to be reminded of a definition but not so useful for finding an explanation of something you don't understand.

Statistical Tools for Simulation Practitioners
J.P.C Kleijnen, Marcel Dekker 1987.
(JCML 51.62:51.92 Kle)

A very detailed account of the statistical aspects of simulation modelling. For example, in this book you can find much more detail on replication, batch means *and* regeneration, *than I will have time to cover in the course.*

System Simulation: programming styles and languages
W. Kreutzer, Addison-Wesley, 1986.
(JCML 681.3.06 Kre)

This book aims to present several different simulation modelling languages and styles by repeatedly considering the same or similar systems represented in different styles. These examples are fairly high-level and light-hearted. DEMOS is one of the languages considered.

Quantitative System Performance: computer system analysis using queueing network models
E.D. Lazowska, J.Zahorjan, G.S. Graham and K.C. Sevcik, Prentice Hall, 1984.
(No longer in print, and regrettably the library no longer has a copy; however the full text is freely available over the WWW:
`http://www.cs.washington.edu/homes/lazowska/qsp/`)

This is a good book about queueing networks which also has a very clear explanation of the operational laws and whole section on parameterisation. Like most of the other books on queueing networks, however, much of the material covered by the book is beyond the scope of this course.

Measuring Computer Performance
David J. Lilja, Cambridge University Press 2000.
`copy on order for JCML`

Despite the title this book does consider analytic modelling (in the form of queueing networks) and simulation as well as measurement. However the emphasis is on practical measurement techniques, such as defining metrics, measurement strategies, and related statistical analysis — much more depth than we go into in this course.

Performance Modelling with Deterministic and Stochastic Petri Nets

C. Lindemann, Wiley 1998.

(JCML QA 76.58 Lin)

This recently published book has four parts. The first presents a concise overview of performance modelling and stochastic modelling formalisms (similar to notes 1-10 of our course); the second discusses Petri nets in which transitions have stochastic and deterministic delays in some detail; the third presents a series of case studies based on multiprocessor architectures; the fourth presents the Petri net based modelling tool developed by the author, DSPN-express. *Performance modelling is given a higher profile in this book than in the book by Ajmone Marsan et al., but the net formalism and associated solution techniques are more complicated, due to the presence of deterministic timings, and so go beyond the scope of this course.*

Simulating Computer Systems: techniques and tools

M.H. MacDougall, MIT Press, 1987.

(JCML QA 76.9.A73 Macd.)

This book teaches simulation for performance evaluation based on a series of case studies modelled in a C *based simulation package* SMPL. *The explanations can be a bit long-winded at times, but it does address statistical techniques as well as model validation and verification.*

Capacity Planning and Performance Modelling: from mainframes to client-server systems

D.A.Menasce, V.A.F. Almeida and L.W. Dowdy, Prentice Hall, 1994.

(JCML QA 76.9.C63 Men)

This book takes a practical, example-led approach to introducing the capacity planning aspect of computer performance evaluation. It mostly concentrates on models based on queueing networks, and goes into this topic in much greater depth than we do within the course. However it also has sections on operational laws, model validation and verification and workload characterisation.

Probabilistic Modelling

I. Mitrani, Cambridge University Press, 1998.

(JCML QA 273 Mit.)

This is an excellent introduction to probability theory, Markov processes and queueing networks. You might find the early chapters useful revision of material from Maths 2Y. It covers most of the material in the first half of the course, with the exception of GSPN modelling, often in more detail than we have time for. The more extended discussions may help clarify ideas for you, so this could be a good book to read along side lecture notes 1 to 10.

Computer Networks and Systems: Queueing Theory and Performance Evaluation (Second Edition)
T.G. Robertazzi, Springer-Verlag, 1994.
(JCML TK 5105 Rob.)

As the title suggests this book is mostly concerned with product form queueing networks. However, it does also have chapters on numerical solution and on Stochastic Petri Nets. The discussion of SPN is restricted to a subset of SPN models which have a particular structure which means that they also exhibit a product form steady state probability distribution. This is beyond the scope of this course.

Introduction to the Numerical Solution of Markov Chains
W.J. Stewart, Princeton University Press, 1994.
(JCML QA 274.7 Ste.)

This is a very detailed book about solution methods for both discrete time and continuous time Markov chains. The first chapter contains a comprehensive introduction to Markov chains, and a section on queueing networks. The rest of the book is concerned with efficient techniques for finding the steady state probability distribution, especially for models with large state spaces.

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