

Simulation Modeling And Analysis Mcgraw Hill Series In Industrial Engineering And Management

This book provides a self-contained review of all the relevant topics in probability theory. A software package called MAXIM, which runs on MATLAB, is made available for downloading. Vidyadhar G. Kulkarni is Professor of Operations Research at the University of North Carolina at Chapel Hill.

The only complete guide to all aspects and uses of simulation—from the international leaders in the field There has never been a single definitive source of key information on all facets of discrete-event simulation and its applications to major industries. The Handbook of Simulation brings together the contributions of leading academics, practitioners, and software developers to offer authoritative coverage of the principles, techniques, and uses of discrete-event simulation. Comprehensive in scope and thorough in approach, the Handbook is the one reference on discrete-event simulation that every industrial engineer, management scientist, computer scientist, operations manager, or operations researcher involved in problem-solving should own, with an in-depth examination of:

- * Simulation methodology, from experimental design to data analysis and more
- * Recent advances, such as object-oriented simulation, on-line simulation, and parallel and distributed simulation
- * Applications across a full range of manufacturing and service industries
- * Guidelines for successful simulations and sound simulation project management
- * Simulation software and simulation industry vendors

New, Now, Next. Consumers' ever growing appetite to acquire new products and their short courtship with them has kept manufacturers busy not only expending resources at an alarming rate, but also depleting these resources and giving rise to waste and pollution at a correspondingly increasing and disturbing rate. Traditional manufacturing methods that use mainly virgin materials to produce new products and dispose of the used products at the end of their lives are quickly becoming unsustainable. In addition, regulations that require manufacturers to take back products and dispose of them responsibly have forced manufacturers to establish dedicated facilities for product recovery—systems that minimize waste and maximize remanufacturing and recycling. Remanufacturing Modeling and Analysis explores the design, planning and processing issues encountered in remanufacturing systems and provides examples of quantitative modeling methodologies to deal with them. The book covers the history, industry size and potential, comparison with other end-of-life options, benefits, conditions, challenges, and steps in a typical process. It provides a brief overview of each of the industrial engineering and operations research techniques used in the book and explains the models developed to increase the remanufacturability of product designs. The book also discusses how increasingly stringent environmental regulations and decreasing natural resources influence manufacturers toward more environmentally conscious manufacturing and product recovery initiatives. With easy-to-use mathematical or simulation modeling that demonstrates solutions for each remanufacturing issue, the book helps practitioners understand how a particular issue can be effectively modeled and how to choose the appropriate solution methodology. An in-depth look at quantitative analysis for remanufacturing systems, the book provides a foundation upon which to build a body of knowledge in this fast and growing area.

Introduction to Modeling and Simulation with MATLAB and Python is intended for students and professionals in science, social science, and engineering that wish to learn the principles of computer modeling, as well as basic programming skills. The book content focuses on meeting a set of basic modeling and simulation competencies that were developed as part of several National Science Foundation grants. Even though computer science students are much more expert programmers, they are not often given the opportunity to see how those skills are being applied to solve complex science and engineering problems and may also not be aware of the libraries used by scientists to create those models. The book interleaves chapters on modeling concepts and related exercises with programming concepts and exercises. The authors start with an introduction to modeling and its importance to current practices in the sciences and engineering. They introduce each of the programming environments and the syntax used to represent variables and compute mathematical equations and functions. As students gain more programming expertise, the authors return to modeling concepts, providing starting code for a variety of exercises where students add additional code to solve the problem and provide an analysis of the outcomes. In this way, the book builds both modeling and programming expertise with a "just-in-time" approach so that by the end of the book, students can take on relatively simple modeling example on their own. Each chapter is supplemented with references to additional reading, tutorials, and exercises that guide students to additional help and allows them to practice both their programming and analytical modeling skills. In addition, each of the programming related chapters is divided into two parts – one for MATLAB and one for Python. In these chapters, the authors also refer to additional online tutorials that students can use if they are having difficulty with any of the topics. The book culminates with a set of final project exercise suggestions that incorporate both the modeling and programming skills provided in the rest of the volume. Those projects could be undertaken by individuals or small groups of students. The companion website at <http://www.intromodeling.com> provides updates to instructions when there are substantial changes in software versions, as well as electronic copies of exercises and the related code. The website also offers a space where people can suggest additional projects they are willing to share as well as comments on the existing projects and exercises throughout the book. Solutions and lecture notes will also be available for qualifying instructors.

Simulation Modeling and Analysis McGraw-Hill Science, Engineering & Mathematics

This text presents the practical application of queueing theory results for the design and analysis of manufacturing and production systems. This textbook makes accessible to undergraduates and beginning graduates many of the seemingly esoteric results of queueing theory. In an effort to apply queueing theory to practical problems, there has been considerable research over the previous few decades in developing reasonable approximations of queueing results. This text takes full advantage of these results and indicates how to apply queueing approximations for the analysis of manufacturing systems.

Support is provided through the web site <http://msma.tamu.edu>. Students will have access to the answers of odd numbered problems and instructors will be provided with a full solutions manual, Excel files when needed for homework, and computer programs using Mathematica that can be used to solve homework and develop additional problems or term projects. In this second edition a separate appendix dealing with some of the basic event-driven simulation concepts has been added.

Simulation with Arena provides a comprehensive treatment of simulation using industry-standard Arena software. The text starts by having the reader develop simple high-level models, and then progresses to advanced modeling and analysis. Statistical design and analysis of simulation experiments is integrated with the modeling chapters, reflecting the importance of mathematical modeling of these activities. Since the publication of the first edition in 1982, the goal of Simulation Modeling and Analysis has always been to provide a comprehensive, state-of-the-art, and technically correct treatment of all important aspects of a simulation study. The book strives to make this material understandable by the use of intuition and numerous figures, examples, and problems. It is equally well suited for use in university courses, simulation practice, and self study. The book is widely regarded as the "bible" of simulation and now has more than 100,000 copies in print. The book can serve as the primary text for a variety of courses; for example:

- *A first course in simulation at the junior, senior, or beginning-graduate-student level in engineering, manufacturing, business, or computer science (Chaps. 1 through 4, and parts of Chaps. 5 through 9). At the end of such a course, the students will be prepared to carry out complete and effective simulation studies, and to take advanced simulation courses.
- *A second course in simulation for graduate students in any of the above disciplines (most of Chaps. 5 through 12). After completing this course, the student should be familiar with the more advanced methodological issues involved in a simulation study, and should be prepared to understand and conduct simulation research.
- *An introduction to simulation as part of a general course in operations research or management science (part of

Chaps. 1, 3, 5, 6, and 9).

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Insightful modelling of dynamic systems for better business strategy The business environment is constantly changing and organisations need the ability to rehearse alternative futures. By mimicking the interlocking operations of firms and industries, modelling serves as a 'dry run' for testing ideas, anticipating consequences, avoiding strategic pitfalls and improving future performance. Strategic Modelling and Business Dynamics is an essential guide to credible models; helping you to understand modelling as a creative process for distilling and communicating those factors that drive business success and sustainability. Written by an internationally regarded authority, the book covers all stages of model building, from conceptual to analytical. The book demonstrates a range of in-depth practical examples that vividly illustrate important or puzzling dynamics in firm operations, strategy, public policy, and everyday life. This updated new edition also offers a rich Learners' website with models, articles and videos, as well as a separate Instructors' website resource, with lecture slides and other course materials (see Related Websites/Extra section below). Together the book and websites deliver a powerful package of blended learning materials that:

- Introduce the system dynamics approach of modelling strategic problems in business and society
- Include industry examples and public sector applications with interactive simulators and contemporary visual modelling software
- Provide the latest state-of-the-art thinking, concepts and techniques for systems modelling

The comprehensive Learners' website features models, microworlds, journal articles and videos. Easy-to-use simulators enable readers to experience dynamic complexity in business and society. Like would-be CEOs, readers can re-design operations and then re-simulate in the quest for well-coordinated strategy and better performance. The simulators include a baffling hotel shower, a start-up low-cost airline, an international radio broadcaster, a diversifying tyre maker, commercial fisheries and the global oil industry. "Much more than an introduction, John Morecroft's Strategic Modelling and Business Dynamics uses interactive 'mini-simulators and microworlds' to create an engaging and effective learning environment in which readers, whatever their background, can develop their intuition about complex dynamic systems." John Sterman, Jay W. Forrester Professor of Management, MIT Sloan School of Management "Illustrated by examples from everyday life, business and policy, John Morecroft expertly demonstrates how systems thinking aided by system dynamics can improve our understanding of the world around us." Stewart Robinson, Associate Dean Research, President of the Operational Research Society, Professor of Management Science, School of Business and Economics, Loughborough University

"In formulating a stochastic model to describe a real phenomenon, it used to be that one compromised between choosing a model that is a realistic replica of the actual situation and choosing one whose mathematical analysis is tractable. That is, there did not seem to be any payoff in choosing a model that faithfully conformed to the phenomenon under study if it were not possible to mathematically analyze that model. Similar considerations have led to the concentration on asymptotic or steady-state results as opposed to the more useful ones on transient time. However, the relatively recent advent of fast and inexpensive computational power has opened up another approach--namely, to try to model the phenomenon as faithfully as possible and then to rely on a simulation study to analyze it"--

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Master the modeling, analysis, and simulation of today's power systems This comprehensive textbook discusses all the major modelling and simulation tools and techniques that a power engineer needs, and explains how those tools can be applied to modern power systems. The applications include loadflow studies, contingency analysis, transient and voltage stability studies, state estimation and phasor estimation studies, co-simulation studies. Written by a recognized expert in the field, Simulation and Analysis of Modern Power Systems contains real-world examples worked out in MATLAB, PSCA, and Power World EMTP and RTDS. You will get a thorough overview of power system fundamentals and learn, step by step, how to efficiently emulate and analyze the myriad components of modern power systems. The book introduces the most state-of-the-art power simulation tool available today, the Real Time Digital Simulator (RTDS) and its Hardware-In-Loop (HIL) capabilities. Explains how each technique is used in many essential applications Introduces the Real Time Digital Simulator (RTDS) and its Hardware-In-Loop (HIL) capabilities Written by a power systems expert and experienced educator

Modeling and Analysis of Dynamic Systems, Third Edition introduces MATLAB®, Simulink®, and Simscape™ and then utilizes them to perform symbolic, graphical, numerical, and simulation tasks. Written for senior level courses/modules, the textbook meticulously covers techniques for modeling a variety of engineering systems, methods of response analysis, and introductions to mechanical vibration, and to basic control systems. These features combine to provide students with a thorough knowledge of the mathematical modeling and analysis of dynamic systems. The Third Edition now includes Case Studies, expanded coverage of system identification, and updates to the computational tools included.

Enjoy learning a key technology. Undergraduates and beginning graduates in both first and second simulation courses have responded positively to the approach taken in this text, which illustrates simulation principles using the popular Simio product. This economy version substitutes grayscale interior graphics to keep costs low for students. Content: This textbook explains how to use simulation to make better business decisions in application domains from healthcare to mining, heavy manufacturing to supply chains, and everything in between. It is written to help both technical and non-technical users better understand the concepts and usefulness of simulation. It can be used in a classroom environment or in support of independent study.

Modern software makes simulation more useful and accessible than ever and this book illustrates simulation concepts with Simio, a leader in simulation software. Author Statement: This book can serve as the primary text in first and second courses in simulation at both the undergraduate and beginning-graduate levels. It is written in an accessible tutorial-style writing approach centered on specific examples rather than general concepts, and covers a variety of applications including an international flavor. Our experience has shown that these characteristics make the text easier to read and absorb, as well as appealing to students from many different cultural and applications backgrounds. A first simulation course would probably cover Chapter 1 through 8 thoroughly, and likely Chapters 9 and 10, particularly for upper class or graduate level students. For a second simulation course, it might work to skip or quickly review Chapters 1-3 and 6, thoroughly cover all other chapters up to Chapter 10, and use Chapter 11 as reinforcing assignments. The text or components of it could also support a simulation module of a few weeks within a larger survey course in programs without a stand-alone simulation course (e.g., MBA). For a simulation module that's part of a larger survey course, we recommend concentrating on Chapters 1, 4, and 5, and then perhaps lightly touch on Chapters 7 and 8. The extensibility introduced in Chapter 10 could provide some interesting project work for a graduate student with some programming background, as it could be easily linked to other research topics. Likewise Appendix A could be used as the lead-in to some advanced study or research in the latest techniques in simulation-based planning and scheduling. Supplemental course material is also available on-line. Third Edition: The new third edition adds sections on Randomness in Simulation, Model Debugging, and Monte Carlo simulation. In addition, the coverage of animation, input analysis and output analysis has been significantly expanded. There is a new appendix on simulation-based scheduling, end-of-chapter problems have been improved and expanded, and we have incorporated many reader suggestions. We have reorganized the material for improved flow, and have updates throughout the book for many of the new Simio features recently added. A new format better supports our e-book users, and a new publisher supports significant cost reduction for our readers.

Simulation with Arena provides a comprehensive treatment of simulation using industry-standard Arena software. The text starts by having the reader develop simple high-level models, and then progresses to advanced modeling and analysis. Statistical design and analysis of simulation experiments is integrated with the modeling chapters, reflecting the importance of mathematical modeling of these activities. An informal, tutorial writing style is used to aid the beginner in fully understanding the ideas and topics presented. The academic version of Arena and example files are available through the book's website. McGraw-Hill is proud to offer Connect with the sixth edition of Kelton's, Simulation with Arena. This innovative and powerful system helps your students learn more efficiently and gives you the ability to customize your homework problems simply and easily. Track individual student performance - by question, assignment, or in relation to the class overall with detailed grade reports. ConnectPlus provides students with all the advantages of Connect, plus 24/7 access to an eBook. Kelton's Simulation with Arena, sixth edition, includes the power of McGraw-Hill's LearnSmart a proven adaptive learning system that helps students learn faster, study more efficiently, and retain more knowledge through a series of adaptive questions. This innovative study tool pinpoints concepts the student does not understand and maps out a personalized plan for success.

"This is an excellent and well-written text on discrete event simulation with a focus on applications in Operations Research. There is substantial attention to programming, output analysis, pseudo-random number generation and modelling and these sections are quite thorough. Methods are provided for generating pseudo-random numbers (including combining such streams) and for generating random numbers from most standard statistical distributions." --ISI Short Book Reviews, 22:2, August 2002

Emphasizes a hands-on approach to learning statistical analysis and model building through the use of comprehensive examples, problems sets, and software applications With a unique blend of theory and applications, Simulation Modeling and Arena®, Second Edition integrates coverage of statistical analysis and model building to emphasize the importance of both topics in simulation. Featuring introductory coverage on how simulation works and why it matters, the Second Edition expands coverage on static simulation and the applications of spreadsheets to perform simulation. The new edition also introduces the use of the open source statistical package, R, for both performing statistical testing and fitting distributions. In addition, the models are presented in a clear and precise pseudo-code form, which aids in understanding and model communication. Simulation Modeling and Arena, Second Edition also features: Updated coverage of necessary statistical modeling concepts such as confidence interval construction, hypothesis testing, and parameter estimation Additional examples of the simulation clock within discrete event simulation modeling involving the mechanics of time advancement by hand simulation A guide to the Arena Run Controller, which features a debugging scenario New homework problems that cover a wider range of engineering applications in transportation, logistics, healthcare, and computer science A related website with an Instructor's Solutions Manual, PowerPoint® slides, test bank questions, and data sets for each chapter Simulation Modeling and Arena, Second Edition is an ideal textbook for upper-undergraduate and graduate courses in modeling and simulation within statistics, mathematics, industrial and civil engineering, construction management, business, computer science, and other departments where simulation is practiced. The book is also an excellent reference for professionals interested in mathematical modeling, simulation, and Arena.

Offers comprehensive coverage of discrete-event simulation, emphasizing and describing the procedures used in operations research - methodology, generation and testing of random numbers, collection and analysis of input data, verification of simulation models and analysis of output data.

Today's leading authority on the subject of this text is the author, MIT Standish Professor of Management and Director of the System Dynamics Group, John D. Sterman. Sterman's objective is to explain, in a true textbook format, what system dynamics is, and how it can be successfully applied to solve business and organizational problems. System dynamics is both a currently utilized approach to organizational problem solving at the professional level, and a field of study in business, engineering, and social and physical sciences.

CONTENIDO: Models - Random-number generation - Discrete-event simulation - Statistics - Next-event simulation - Discrete random variables - Continuous random variables - Output analysis - Input modeling - Projects.

Explore the latest power electronics principles, practices, and applications This electrical engineering guide offers comprehensive coverage of design, modeling, simulation, and control for power electronics. The book describes real-world applications for the technology and features case studies worked out in both MATLAB and Simulink. Presented in an accessible style, Power Electronics Step-by-Step: Design, Modeling, Simulation, and Control focuses on the latest technologies, such as DC-based systems, and emphasizes the averaging technique for both

simulation and modeling. You will get photos, diagrams, flowcharts, graphs, equations, and tables that illustrate each topic. Circuit components Non-isolated DC/DC conversion Power analysis DC to single-phase AC conversion Single-phase AC to DC conversion Galvanic isolated DC/DC conversion Power conversion for three-phase AC Bidirectional power conversion Averaging model for simulation Dynamic modeling of DC/DC converters Regulation of voltage and current

Nelson covers sample paths, basics, arrival-counting processes, discrete-time processes, continuous time processes, queueing processes and topics in simulation of stochastic processes. Enhance your simulation modeling skills by creating and analyzing digital prototypes of a physical model using Python programming with this comprehensive guide Key Features Learn to create a digital prototype of a real model using hands-on examples Evaluate the performance and output of your prototype using simulation modeling techniques Understand various statistical and physical simulations to improve systems using Python Book Description Simulation modeling helps you to create digital prototypes of physical models to analyze how they work and predict their performance in the real world. With this comprehensive guide, you'll understand various computational statistical simulations using Python. Starting with the fundamentals of simulation modeling, you'll understand concepts such as randomness and explore data generating processes, resampling methods, and bootstrapping techniques. You'll then cover key algorithms such as Monte Carlo simulations and Markov decision processes, which are used to develop numerical simulation models, and discover how they can be used to solve real-world problems. As you advance, you'll develop simulation models to help you get accurate results and enhance decision-making processes. Using optimization techniques, you'll learn to modify the performance of a model to improve results and make optimal use of resources. The book will guide you in creating a digital prototype using practical use cases for financial engineering, prototyping project management to improve planning, and simulating physical phenomena using neural networks. By the end of this book, you'll have learned how to construct and deploy simulation models of your own to overcome real-world challenges. What you will learn Gain an overview of the different types of simulation models Get to grips with the concepts of randomness and data generation process Understand how to work with discrete and continuous distributions Work with Monte Carlo simulations to calculate a definite integral Find out how to simulate random walks using Markov chains Obtain robust estimates of confidence intervals and standard errors of population parameters Discover how to use optimization methods in real-life applications Run efficient simulations to analyze real-world systems Who this book is for Hands-On Simulation Modeling with Python is for simulation developers and engineers, model designers, and anyone already familiar with the basic computational methods that are used to study the behavior of systems. This book will help you explore advanced simulation techniques such as Monte Carlo methods, statistical simulations, and much more using Python. Working knowledge of Python programming language is required.

The book comprises a number of research papers presented at several Computers in Railways Conferences. It has been compiled by Ingo A. Hansen, President of the International Association of Railway Operations Research (IAROR) and comprises selected papers originating from different countries, such as Denmark, France, Germany, Japan, Italy, Netherlands, Sweden and Switzerland. The papers give an overview of the current state-of-the-art analytical approaches, methods and simulation tools for the modelling and analysis of network timetables, the distribution of train delays and real-time rescheduling of perturbed operations. The topics include e.g. railway capacity estimation according to the UIC norm 406, train punctuality analysis based on standard track occupation and clearance data, and boarding, alighting and distribution of passengers along suburban trains, as well as fast recognition and resolution of conflicts between train movements in case of disturbances by means of real-time speed adaptation, re-ordering or re-routing. The book can serve as an introduction to the theory of railway traffic, timetable design, operations analysis, simulation, safety and control for Master and PhD students from engineering faculties and professionals working in the railway industry.

A primary text in introductory and perhaps second courses in simulation at both the under-graduate and beginning-graduate levels. Such simulation courses are found in departments of industrial and systems engineering, most business schools, and many computer-science departments; simulation courses are also found in other engineering disciplines (mechanical, civil, electrical, chemical), mathematics, statistics, epidemiology, and agriculture. The text or components of it could also support a simulation module of a few weeks within a larger survey course in programs without a stand-alone simulation course (e.g., MBA). It is written in an accessible tutorial-style writing approach centered around specific examples rather than general concepts, and covers a variety of applications. Our experience has shown that these characteristics make the text easier to read and absorb, as well as appealing to students from many different backgrounds.

Computer simulation modeling, the new force in business, allows managers to see the results of a process change before committing time and resources to it. The Simulation Modeling Toolkit is vital to understanding numerous applications of this important process. Its methods and techniques will help any reader reduce time and risk in developing new products and serving customers, and the CD-ROM insert enables the user to create and run simulations from start to finish.

This senior/graduate-level text is the classic text in its field and established itself as the authoritative source on the theory & practice of simulation over 15 years ago. It is used in most of the better schools of engineering and in some business programs as well.

This book addresses the application of simulation modelling techniques in order to enable better informed decisions in business and industrial organisations. The book's unique approach treats simulation not just as a technical tool, but as a support for organisational decision making, showing the results from a survey of current and potential users of simulation to suggest reasons why the technique is not used as much as it should be and what are the barriers to its further use.

Highly effective thinking is an art that engineers and scientists can be taught to develop. By presenting actual experiences and analyzing them as they are described, the author conveys the developmental thought processes employed and shows a style of thinking that leads to successful results is something that can be learned. Along with spectacular successes, the author also conveys how failures contributed to shaping the thought processes. Provides the reader with a style of thinking that will enhance a person's ability to function as a problem-solver of complex technical issues. Consists of a collection of stories about the author's participation in significant discoveries, relating how those discoveries came about and, most importantly, provides analysis about the thought processes and reasoning that took place as the author and his associates progressed through

engineering problems.

THEORY AND PRACTICE OF MODELING AND SIMULATING HUMAN PHYSIOLOGY Written by a coinventor of the Human Patient Simulator (HPS) and past president of the Society in Europe for Simulation Applied to Medicine (SESAM), Modeling and Simulation in Biomedical Engineering: Applications in Cardiorespiratory Physiology is a compact and consistent introduction to this expanding field. The book divides the modeling and simulation process into five manageable steps--requirements, conceptual models, mathematical models, software implementation, and simulation results and validation. A framework and a basic set of deterministic, continuous-time models for the cardiorespiratory system are provided. This timely resource also addresses advanced topics, including sensitivity analysis and setting model requirements as part of an encompassing simulation and simulator design. Practical examples provide you with the skills to evaluate and adapt existing physiologic models or create new ones for specific applications. Coverage includes: Signals and systems Model requirements Conceptual models Mathematical models Software implementation Simulation results and model validation Cardiorespiratory system model Circulation Respiration Physiologic control Sensitivity analysis of a cardiovascular model Design of model-driven acute care training simulators "Uniquely qualified to author such a text, van Meurs is one of the original developers of CAE Healthcare's Human Patient Simulator (HPS). ...His understanding of mathematics, human physiology, pharmacology, control systems, and systems engineering, combined with a conversational writing style, results in a readable text. ...The ample illustrations and tables also break up the text and make reading the book easier on the eyes. ...concise yet in conversational style, with real-life examples. This book is highly recommended for coursework in physiologic modeling and for all who are interested in simulator design and development. The book pulls all these topics together under one cover and is an important contribution to biomedical literature." --IEEE Pulse, January 2014 "This book is written by a professional engineer who is unique in that he seems to have a natural understanding of 3 key areas as follows: the hardware involved with simulators, human physiology, and mathematical modeling. Willem van Meurs is one of the inventors of the model-driven human patient simulator (HPS), and so, he is very qualified to write this book. The book is written in a clear way, using the first person throughout, in a conversational manner, with a style that involves posing questions and answering them in subsequent text. ...The book starts with a very useful introduction and background chapter, setting out the scene for the rest of the book. ...I have used his book in enhancing my own talks and understanding human patient simulation and can strongly recommend it." --Simulation in Healthcare December, 2012 Reviewed by Mark A. Tooley, Ph.D., Department of Medical Physics and Bioengineering, Royal United Hospital, Combe Park, Bath, UK.

The first edition of this book was the first text to be written on the Arena software, which is a very popular simulation modeling software. What makes this text the authoritative source on Arena is that it was written by the creators of Arena themselves. The new third edition follows in the tradition of the successful first and second editions in its tutorial style (via a sequence of carefully crafted examples) and an accessible writing style. The updates include thorough coverage of the new version of the Arena software (Arena 7.01), enhanced support for Excel and Access, and updated examples to reflect the new version of software. The CD-ROM that accompanies the book contains the Academic version of the Arena software. The software features new capabilities such as model documentation, enhanced plots, file reading and writing, printing and animation symbols. Content: The book is organized into three parts: Simulation Concepts, Simulation Model-Building with Simio, and Case Studies Using Simio. Each part is composed of two to six focused chapters. While the book as a whole will be fully integrated, the various chapters could stand alone as a module of a few weeks in a larger survey course, as well as serve as the foundation of a whole course on simulation that would go on to include some or all of the last three parts. Author Statement: Our objective is for this book to serve as the primary text in introductory and perhaps second courses in simulation at both the undergraduate and beginning-graduate levels. The text or components of it could also support a simulation module of a few weeks within a larger survey course in programs without a stand-alone simulation course (e.g., MBA). It is written in an accessible tutorial-style writing approach centered around specific examples rather than general concepts, and covers a variety of applications including an international flavor.

Accompanying CD-ROM contains ... "the Student Version of the ExpertFit distribution-fitting software."--Page 4 of cover.

Explores wide-ranging applications of modeling and simulation techniques that allow readers to conduct research and ask "Whatif??" Principles of Modeling and Simulation: A Multidisciplinary Approach is the first book to provide an introduction to modeling and simulation techniques across diverse areas of study. Numerous researchers from the fields of social science, engineering, computer science, and business have collaborated on this work to explore the multifaceted uses of computational modeling while illustrating their applications in common spreadsheets. The book is organized into three succinct parts: Principles of Modeling and Simulation provides a brief history of modeling and simulation, outlines its many functions, and explores the advantages and disadvantages of using models in problem solving. Two major reasons to employ modeling and simulation are illustrated through the study of a specific problem in conjunction with the use of related applications, thus gaining insight into complex concepts. Theoretical Underpinnings examines various modeling techniques and introduces readers to two significant simulation concepts: discrete event simulation and simulation of continuous systems. This section details the two primary methods in which humans interface with simulations, and it also distinguishes the meaning, importance, and significance of verification and validation. Practical Domains delves into specific topics related to transportation, business, medicine, social science, and enterprise decision support. The challenges of modeling and simulation are discussed, along with advanced applied principles of modeling and simulation such as representation techniques, integration into the application infrastructure, and emerging technologies. With its accessible style and wealth of real-world examples, Principles of Modeling and Simulation: A Multidisciplinary Approach is a valuable book for modeling and simulation courses at the upper-undergraduate and graduate levels. It is also an indispensable reference for researchers and practitioners working in statistics, mathematics, engineering, computer science, economics, and the social sciences who would like to further develop their understanding and

knowledge of the field.

Discrete Event Simulation is a process-oriented text/reference that utilizes an eleven-step model to represent the simulation process from problem formulation to implementation and documentation. The book presents the necessary level of detail required to fully develop a model that produces meaningful results and considers the tools necessary to interpret those results. Sufficient background information is provided so that the underlying concepts of simulation are understood. Major topics covered in Discrete Event Simulation include probability and distributional theory, statistical estimation and inference, the generation of random variates, verification and validation techniques, time management methods, experimental design, and programming language considerations. The book also examines distributed simulation and issues related to distributing the physical process over a network of tightly coupled processors. Topics covered in this area include deadlock, synchronization, rollback, event management, and communication processes. Fully worked examples and numerous practical exercises have been drawn from the engineering disciplines and computer science, although they have been structured so that they will be useful as well to other disciplines such as economics, business administration, and management science. The presentation of techniques and methods in Discrete Event Simulation make it an ideal text/reference for all practitioners of discrete event simulation.

This book constitutes the proceedings of the International Conference on ENTERprise information systems, held Viana do Castelo, Portugal, in October 2010.

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