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For courses in Performance Analysis and Design of Communication Networks (PC) offered in departments of Electrical and Computer Engineering. Also appropriate for courses in Systems Engineering and Operations Research. Kobayashi and Mark present the most up-to-date analytical models, simulation techniques, and computational algorithms useful for performance evaluation of complex systems including computer systems, communication networks, transportation systems, and manufacturing systems. Broader in scope than other texts, this book provides more in-depth coverage of topics such as computational algorithms and approximations. It appeals to students with a background or interest in a wide range of areas, including systems analysis or telecommunication networks.

This book will provide answers to the most common questions that face enterprise leaders concerning service oriented architecture development lifecycle initiatives. It is a guide for service-oriented projects. The tentative chapters are: (1) Introduction to Service Modeling; (2) Service Polymorphism; (3) Service Typing and Service Structure Model; (4) Service Development Lifecycle Model; (5) Service Conceptualization; (6) Service Discovery and Analysis; (7) Business Service Architecture; (8) Service Design and Realization; (9) Service Architecture Conceptualization; (10) Service Architecture Modeling.

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Rigorous theory and real-world applications for modeling and analysis of the behavior of complex communicating computer systems. Complex communicating computer systems—computers connected by data networks and in constant communication with their environments—do not always behave as expected. This book introduces behavioral modeling, a rigorous approach to behavioral specification and verification of concurrent and distributed systems. It is among the very few techniques capable of modeling systems interaction at a level of abstraction sufficient for the interaction to be understood and analyzed. Offering both a mathematically grounded theory and real-world applications, the book is suitable for classroom use and as a reference for system architects. The book covers the foundation of behavioral modeling using process algebra, transition systems, abstract data types, and modal logics. Exercises and examples augment the theoretical discussion. The book introduces a modeling language, mCRL2, that enables concise descriptions of even the most intricate distributed algorithms and protocols. Using behavioral axioms and such proof methods as confluence, cones, and foci, readers will learn how to prove such algorithms equal to their specifications. Specifications in mCRL2 can be simulated, visualized, or verified against their requirements. An extensive mCRL2 toolset for mechanically verifying the requirements is freely available online; this toolset has been successfully used to design and analyze industrial software that ranges from healthcare applications to particle accelerators at CERN. Appendixes offer material on equations and notation as well as exercise solutions.

Teaches basic and advanced modeling and simulation techniques to both undergraduate and postgraduate students and serves as a practical guide and manual for professionals learning how to build simulation models using WITNESS, a free-standing software package. This book

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discusses the theory behind simulation and demonstrates how to build simulation models with WITNESS. The book begins with an explanation of the concepts of simulation modeling and a “guided tour” of the WITNESS modeling environment. Next, the authors cover the basics of building simulation models using WITNESS and modeling of material-handling systems. After taking a brief tour in basic probability and statistics, simulation model input analysis is then examined in detail, including the importance and techniques of fitting closed-form distributions to observed data. Next, the authors present simulation output analysis including determining run controls and statistical analysis of simulation outputs and show how to use these techniques and others to undertake simulation model verification and validation. Effective techniques for managing a simulation project are analyzed, and case studies exemplifying the use of simulation in manufacturing and services are covered. Simulation-based optimization methods and the use of simulation to build and enhance lean systems are then discussed. Finally, the authors examine the interrelationships and synergy between simulation and Six Sigma. Emphasizes real-world applications of simulation modeling in both services and manufacturing sectors Discusses the role of simulation in Six Sigma projects and Lean Systems Contains examples in each chapter on the methods and concepts presented Process Simulation Using WITNESS is a resource for students, researchers, engineers, management consultants, and simulation trainers.

Offers timely and comprehensive coverage of dynamic system reliability theory This book focuses on hot issues of dynamic system reliability, systematically introducing the reliability modeling and analysis methods for systems with imperfect fault coverage, systems with function dependence, systems subject to deterministic or probabilistic common-cause failures,

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systems subject to deterministic or probabilistic competing failures, and dynamic standby sparing systems. It presents recent developments of such extensions involving reliability modelling theory, reliability evaluation methods, and features numerous case studies based on real-world examples. The presented dynamic reliability theory can enable a more accurate representation of actual complex system behavior, thus more effectively guiding the reliable design of real-world critical systems. *Dynamic System Reliability: Modelling and Analysis of Dynamic and Dependent Behaviors* begins by describing the evolution from the traditional static reliability theory to the dynamic system reliability theory, and provides a detailed investigation of dynamic and dependent behaviors in subsequent chapters. Although written for those with a background in basic probability theory and stochastic processes, the book includes a chapter reviewing the fundamentals that readers need to know in order to understand contents of other chapters which cover advanced topics in reliability theory and case studies. The first book systematically focusing on dynamic system reliability modelling and analysis theory Provides a comprehensive treatment on imperfect fault coverage (single-level/multi-level or modular), function dependence, common cause failures (deterministic and probabilistic), competing failures (deterministic and probabilistic), and dynamic standby sparing Includes abundant illustrative examples and case studies based on real-world systems Covers recent advances in combinatorial models and algorithms for dynamic system reliability analysis Offers a rich set of references, providing helpful resources for readers to pursue further research and study of the topics *Dynamic System Reliability: Modelling and Analysis of Dynamic and Dependent Behaviors* is an excellent book for undergraduate and graduate students, and engineers and researchers in reliability and related disciplines.

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Multivariable Modeling and Multivariate Analysis for the Behavioral Sciences shows students how to apply statistical methods to behavioral science data in a sensible manner. Assuming some familiarity with introductory statistics, the book analyzes a host of real-world data to provide useful answers to real-life issues. The author begins by exploring

Modeling and Analysis of Local Area Networks fills a void in the array of books on Local Area Networks (LANs) in that it reviews the state of LAN technology from a hardware and software perspective, develops a set of metrics that can be used to evaluate LANs for end applications, and investigates methodologies for evaluating LANs from these perspectives. The book discusses LAN evaluation techniques utilizing analysis, operational analysis, hardware testbeds, and simulations. Simulations will be stressed in greater detail and a tool available for evaluating LANs performance (called MALAN) is presented and the details of its structure developed.

Can we coexist with the other life forms that have evolved on this planet? Are there realistic alternatives to fossil fuels that would sustainably provide for human society's energy needs and have fewer harmful effects? How do we deal with threats such as emergent diseases?

Mathematical models—equations of various sorts capturing relationships between variables involved in a complex situation—are fundamental for understanding the potential consequences of choices we make. Extracting insights from the vast amounts of data we are able to collect requires analysis methods and statistical reasoning. This book on elementary topics in mathematical modeling and data analysis is intended for an undergraduate “liberal arts mathematics”-type course but with a specific focus on environmental applications. It is suitable for introductory courses with no prerequisites beyond high school mathematics. A great variety

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of exercises extends the discussions of the main text to new situations and/or introduces new real-world examples. Every chapter ends with a section of problems, as well as with an extended chapter project which often involves substantial computing work either in spreadsheet software or in the R statistical package.

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.

Coherent introduction to techniques also offers a guide to the mathematical, numerical, and simulation tools of systems analysis. Includes formulation of models, analysis, and interpretation of results. 1995 edition.

Simulation Modeling and Analysis with Arena is a highly readable textbook which treats the essentials of the Monte Carlo discrete-event simulation methodology, and does so in the context of a popular Arena simulation environment. It treats simulation modeling as an in-vitro laboratory that facilitates the understanding of complex systems and experimentation with what-if scenarios in order to estimate their performance metrics. The book contains chapters on the simulation modeling methodology and the underpinnings of discrete-event systems, as well as the relevant underlying probability, statistics, stochastic processes, input analysis, model validation and output analysis. All simulation-related concepts

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are illustrated in numerous Arena examples, encompassing production lines, manufacturing and inventory systems, transportation systems, and computer information systems in networked settings. · Introduces the concept of discrete event Monte Carlo simulation, the most commonly used methodology for modeling and analysis of complex systems · Covers essential workings of the popular animated simulation language, ARENA, including set-up, design parameters, input data, and output analysis, along with a wide variety of sample model applications from production lines to transportation systems · Reviews elements of statistics, probability, and stochastic processes relevant to simulation modeling * Ample end-of-chapter problems and full Solutions Manual * Includes CD with sample ARENA modeling programs

Generally, scheduling problems accompanying typical batch processes are vitally important to be solved for improving the plant productivity. In these respects, finding a good and feasible schedule or even an optimal result, by which costs and lead times can be reduced, is often a very complex and also a difficult task. Moreover, in large plants, the challenges come not only from the modeling ways that require systematic and structured approaches, but also from the exact strategies how the performance of the model can be analyzed. The goal of this research is to develop a comprehensive study on industrial-sized plants, with

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regard modeling and analysis of scheduling problems. Formalization of the required plant specifications, the modularly modeling ways which refer to the widely used batch standards, and also the strategies for tackling complexity, are the main contributions of this thesis. These studies will be carried out by using the Timed Net Condition/Event Systems (TNCES) model. Finally, the model is analyzed to synthesize an optimal control strategy for the investigated plants. This completely revised and updated edition of Applied Risk Analysis includes new case studies in modeling risk and uncertainty as well as a new risk analysis CD-ROM prepared by Dr. Mun. On the CD-ROM you'll find his Risk Simulator and Real Options Super Lattice Solver software as well as many useful spreadsheet models. "Johnathan Mun's book is a sparkling jewel in my finance library. Mun demonstrates a deep understanding of the underlying mathematical theory in his ability to reduce complex concepts to lucid explanations and applications. For this reason, he's my favorite writer in this field." —Janet Tavakoli, President, Tavakoli Structured Finance, Inc. and author of Collateralized Debt Obligations and Structured Finance "A must-read for product portfolio managers . . . it captures the risk exposure of strategic investments, and provides management with estimates of potential outcomes and options for risk mitigation." —Rafael E. Gutierrez, Executive Director of Strategic Marketing and

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Planning, Seagate Technology, Inc. "Once again, Dr. Mun has created a 'must-have, must-read' book for anyone interested in the practical application of risk analysis. Other books speak in academic generalities, or focus on one area of risk application. [This book] gets to the heart of the matter with applications for every area of risk analysis. You have a real option to buy almost any book?you should exercise your option and get this one!" —Glenn Kautt, MBA, CFP, EA, President and Chairman, The Monitor Group, Inc. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

A modern, unified introduction to structural modelling and analysis, with an emphasis on the application of energy methods.

Modeling and Analysis of Communicating SystemsMIT Press

Among the many uses of hierarchical modeling, their application to the statistical analysis of spatial and spatio-temporal data from areas such as epidemiology And environmental science has proven particularly fruitful. Yet to date, the few books that address the subject have been either too narrowly focused on specific aspects of spatial analysis,

The purpose of this book is first to study MATLAB programming concepts, then the basic concepts of modeling and simulation analysis, particularly focus on digital communication simulation. The book will cover the topics practically to

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describe network routing simulation using MATLAB tool. It will cover the dimensions' like Wireless network and WSN simulation using MATLAB, then depict the modeling and simulation of vehicles power network in detail along with considering different case studies. Key features of the book include: Discusses different basics and advanced methodology with their fundamental concepts of exploration and exploitation in NETWORK SIMULATION. Elaborates practice questions and simulations in MATLAB Student-friendly and Concise Useful for UG and PG level research scholar Aimed at Practical approach for network simulation with more programs with step by step comments. Based on the Latest technologies, coverage of wireless simulation and WSN concepts and implementations

The Transportation Secure Data Center (TSDC) provides free, web-based access to detailed transportation data from a variety of travel surveys conducted across the nation. Maintained by the National Renewable Energy Laboratory (NREL) in partnership with the U.S. Department of Transportation (DOT), the TSDC houses data from travel surveys and studies conducted using GPS devices. It features millions of data points -- second-by-second GPS readings, vehicle characteristics (if applicable), and demographics -- for all modes of travel. NREL screens the initial data for quality control, translates each data set into a

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consistent format, and interprets the data for spatial analysis. NREL's processing routines add information on vehicle fuel economy and road grades and join data points to the road network.

This book provides a view of low-rank and sparse computing, especially approximation, recovery, representation, scaling, coding, embedding and learning among unconstrained visual data. The book includes chapters covering multiple emerging topics in this new field. It links multiple popular research fields in Human-Centered Computing, Social Media, Image Classification, Pattern Recognition, Computer Vision, Big Data, and Human-Computer Interaction. Contains an overview of the low-rank and sparse modeling techniques for visual analysis by examining both theoretical analysis and real-world applications.

Sensitivity Analysis in Earth Observation Modeling highlights the state-of-the-art in ongoing research investigations and new applications of sensitivity analysis in earth observation modeling. In this framework, original works concerned with the development or exploitation of diverse methods applied to different types of earth observation data or earth observation-based modeling approaches are included. An overview of sensitivity analysis methods and principles is provided first, followed by examples of applications and case studies of different sensitivity/uncertainty analysis implementation methods, covering the full spectrum of sensitivity analysis techniques, including operational products. Finally, the book outlines challenges and future prospects for implementation in earth observation modeling. Information provided in this book is of practical value to readers looking to understand the principles of sensitivity analysis in earth observation modeling, the level of scientific maturity in the field, and

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where the main limitations or challenges are in terms of improving our ability to implement such approaches in a wide range of applications. Readers will also be informed on the implementation of sensitivity/uncertainty analysis on operational products available at present, on global and continental scales. All of this information is vital in the selection process of the most appropriate sensitivity analysis method to implement. Outlines challenges and future prospects of sensitivity analysis implementation in earth observation modeling Provides readers with a roadmap for directing future efforts Includes case studies with applications from different regions around the globe, helping readers to explore strengths and weaknesses of the different methods in earth observation modeling Presents a step-by-step guide, providing the principles of each method followed by the application of variants, making the reference easy to use and follow

With the expansion of new technologies, materials, and the design of complex systems, the expectations of society upon engineers are becoming larger than ever. Engineers make critical decisions with potentially high adverse consequences. The current political, societal, and financial climate requires engineers to formally consider the factors of uncertainty (e.g., floods, earthquakes, winds, environmental risks) in their decisions at all levels. Uncertainty Modeling and Analysis in Civil Engineering provides a thorough report on the immediate state of uncertainty modeling and analytical methods for civil engineering systems, presenting a toolbox for solving problems in real-world situations. Topics include Neural networks Genetic algorithms Numerical modeling Fuzzy sets and operations Reliability and risk analysis Systems control Uncertainty in probability estimates This compendium is a considerable reference for civil engineers as well as for engineers in other disciplines, computer scientists, general

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scientists, and students.

Learn about the techniques used for evaluating the reliability and availability of engineered systems with this comprehensive guide.

The book presents the methodology applicable to the modeling and analysis of a variety of dynamic systems, regardless of their physical origin. It includes detailed modeling of mechanical, electrical, electro-mechanical, thermal, and fluid systems. Models are developed in the form of state-variable equations, input-output differential equations, transfer functions, and block diagrams. The Laplace-transform is used for analytical solutions. Computer solutions are based on MATLAB and Simulink.

System Theory: Modeling, Analysis and Control contains thirty-three scientific papers covering a wide range of topics in systems and control. These papers have been contributed to a symposium organized to celebrate Sanjoy K. Mitter's 65th birthday. The following research topics are addressed: distributed parameter systems, stochastic control, filtering and estimation, optimization and optimal control, image processing and vision, hierarchical systems and hybrid control, nonlinear systems, and linear systems. Also included are three survey papers on optimization, nonlinear filtering, and nonlinear systems. Recent advances are reported on the behavioral approach to systems, the relationship between differential games and robust control, estimation of diffusion processes, Markov processes, optimal control, hybrid control, stochastic control, spectral estimation, nonconvex quadratic programming, robust control, control algorithms and quantized linear systems. Innovative explorations are carried out on quantum systems from a control theory perspective, option valuation and hedging, three-dimensional medical visualization, computational structure biology image

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processing, and hierarchical approaches to complex systems, flow control, scheduling and force feedback in fluid mechanics. The contents reflect on past research accomplishments, current research activity, and future research directions in systems and control theory. Energy costs impact the profitability of virtually all industrial processes. Stressing how plants use power, and how that power is actually generated, this book provides a clear and simple way to understand the energy usage in various processes, as well as methods for optimizing these processes using practical hands-on simulations and a unique approach that details solved problems utilizing actual plant data. Invaluable information offers a complete energy-saving approach essential for both the chemical and mechanical engineering curricula, as well as for practicing engineers.

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).

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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).

Almost every year, a new book on mathematical modeling is published, so, why another? The answer springs directly from the fact that it is very rare to find a book that covers modeling with all types of differential equations in one volume. Until now. *Mathematical Modeling: Models, Analysis and Applications* covers modeling with all kinds of differential equations, namely ordinary, partial, delay, and stochastic. The book also contains a chapter on discrete modeling, consisting of differential equations, making it a complete textbook on this important skill needed for the study of science, engineering, and social sciences. More than just a textbook, this how-to guide presents tools for mathematical modeling and analysis. It offers a wide-ranging overview of mathematical ideas and techniques that provide a number of effective approaches to problem solving. Topics covered include spatial, delayed, and stochastic modeling. The text provides real-life examples of discrete and continuous mathematical modeling scenarios. MATLAB® and Mathematica® are incorporated throughout the text. The examples and exercises in each chapter can be used as problems in a project. Since mathematical modeling involves a diverse range of skills and tools, the author focuses on techniques that will be of particular interest to engineers, scientists, and others who use models of discrete and continuous systems. He gives students a foundation for understanding and using the mathematics that is the basis of computers, and therefore a foundation for success in engineering and science streams.

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Process Modelling and Model Analysis describes the use of models in process engineering. Process engineering is all about manufacturing--of just about anything! To manage processing and manufacturing systematically, the engineer has to bring together many different techniques and analyses of the interaction between various aspects of the process. For example, process engineers would apply models to perform feasibility analyses of novel process designs, assess environmental impact, and detect potential hazards or accidents. To manage complex systems and enable process design, the behavior of systems is reduced to simple mathematical forms. This book provides a systematic approach to the mathematical development of process models and explains how to analyze those models. Additionally, there is a comprehensive bibliography for further reading, a question and answer section, and an accompanying Web site developed by the authors with additional data and exercises. Introduces a structured modeling methodology emphasizing the importance of the modeling goal and including key steps such as model verification, calibration, and validation Focuses on novel and advanced modeling techniques such as discrete, hybrid, hierarchical, and empirical modeling Illustrates the notions, tools, and techniques of process modeling with examples and advances applications

CD-ROM contains: Java and XML implementations of ideas and models

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described in the appendix.

Control systems have come to play an important role in the performance of modern vehicles with regards to meeting goals on low emissions and low fuel consumption. To achieve these goals, modeling, simulation, and analysis have become standard tools for the development of control systems in the automotive industry. Modeling and Control of Engines and Drivelines provides an up-to-date treatment of the topic from a clear perspective of systems engineering and control systems, which are at the core of vehicle design. This book has three main goals. The first is to provide a thorough understanding of component models as building blocks. It has therefore been important to provide measurements from real processes, to explain the underlying physics, to describe the modeling considerations, and to validate the resulting models experimentally. Second, the authors show how the models are used in the current design of control and diagnosis systems. These system designs are never used in isolation, so the third goal is to provide a complete setting for system integration and evaluation, including complete vehicle models together with actual requirements and driving cycle analysis. Key features: Covers signals, systems, and control in modern vehicles Covers the basic dynamics of internal combustion engines and drivelines Provides a set of standard models and

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includes examples and case studies Covers turbo- and super-charging, and automotive dependability and diagnosis Accompanied by a web site hosting example models and problems and solutions Modeling and Control of Engines and Drivelines is a comprehensive reference for graduate students and the authors' close collaboration with the automotive industry ensures that the knowledge and skills that practicing engineers need when analysing and developing new powertrain systems are also covered.

Longitudinal Analysis provides an accessible, application-oriented treatment of introductory and advanced linear models for within-person fluctuation and change. Organized by research design and data type, the text uses in-depth examples to provide a complete description of the model-building process. The core longitudinal models and their extensions are presented within a multilevel modeling framework, paying careful attention to the modeling concerns that are unique to longitudinal data. Written in a conversational style, the text provides verbal and visual interpretation of model equations to aid in their translation to empirical research results. Overviews and summaries, boldfaced key terms, and review questions will help readers synthesize the key concepts in each chapter. Written for non-mathematically-oriented readers, this text features: A description of the data manipulation steps required prior to model estimation so readers can

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more easily apply the steps to their own data An emphasis on how the terminology, interpretation, and estimation of familiar general linear models relates to those of more complex models for longitudinal data Integrated model comparisons, effect sizes, and statistical inference in each example to strengthen readers' understanding of the overall model-building process Sample results sections for each example to provide useful templates for published reports Examples using both real and simulated data in the text, along with syntax and output for SPSS, SAS, STATA, and Mplus at www.PilesOfVariance.com to help readers apply the models to their own data The book opens with the building blocks of longitudinal analysis—general ideas, the general linear model for between-person analysis, and between- and within-person models for the variance and the options within repeated measures analysis of variance. Section 2 introduces unconditional longitudinal models including alternative covariance structure models to describe within-person fluctuation over time and random effects models for within-person change. Conditional longitudinal models are presented in section 3, including both time-invariant and time-varying predictors. Section 4 reviews advanced applications, including alternative metrics of time in accelerated longitudinal designs, three-level models for multiple dimensions of within-person time, the analysis of individuals in groups over time, and repeated

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measures designs not involving time. The book concludes with additional considerations and future directions, including an overview of sample size planning and other model extensions for non-normal outcomes and intensive longitudinal data. Class-tested at the University of Nebraska-Lincoln and in intensive summer workshops, this is an ideal text for graduate-level courses on longitudinal analysis or general multilevel modeling taught in psychology, human development and family studies, education, business, and other behavioral, social, and health sciences. The book's accessible approach will also help those trying to learn on their own. Only familiarity with general linear models (regression, analysis of variance) is needed for this text.

Explanatory Model Analysis Explore, Explain and Examine Predictive Models is a set of methods and tools designed to build better predictive models and to monitor their behaviour in a changing environment. Today, the true bottleneck in predictive modelling is neither the lack of data, nor the lack of computational power, nor inadequate algorithms, nor the lack of flexible models. It is the lack of tools for model exploration (extraction of relationships learned by the model), model explanation (understanding the key factors influencing model decisions) and model examination (identification of model weaknesses and evaluation of model's performance). This book presents a collection of model agnostic

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methods that may be used for any black-box model together with real-world applications to classification and regression problems.

Collecting the work of the foremost scientists in the field, *Discrete-Event Modeling and Simulation: Theory and Applications* presents the state of the art in modeling discrete-event systems using the discrete-event system specification (DEVS) approach. It introduces the latest advances, recent extensions of formal techniques, and real-world examples of various applications. The book covers many topics that pertain to several layers of the modeling and simulation architecture. It discusses DEVS model development support and the interaction of DEVS with other methodologies. It describes different forms of simulation supported by DEVS, the use of real-time DEVS simulation, the relationship between DEVS and graph transformation, the influence of DEVS variants on simulation performance, and interoperability and composability with emphasis on DEVS standardization. The text also examines extensions to DEVS, new formalisms, and abstractions of DEVS models as well as the theory and analysis behind real-world system identification and control. To support the generation and search of optimal models of a system, a framework is developed based on the system entity structure and its transformation to DEVS simulation models. In addition, the book explores numerous interesting examples that illustrate the use

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of DEVS to build successful applications, including optical network-on-chip, construction/building design, process control, workflow systems, and environmental models. A one-stop resource on advances in DEVS theory, applications, and methodology, this volume offers a sampling of the best research in the area, a broad picture of the DEVS landscape, and trend-setting applications enabled by the DEVS approach. It provides the basis for future research discoveries and encourages the development of new applications. Modeling and Analysis of Modern Fluids helps researchers solve physical problems observed in fluid dynamics and related fields, such as heat and mass transfer, boundary layer phenomena, and numerical heat transfer. These problems are characterized by nonlinearity and large system dimensionality, and 'exact' solutions are impossible to provide using the conventional mixture of theoretical and analytical analysis with purely numerical methods. To solve these complex problems, this work provides a toolkit of established and novel methods drawn from the literature across nonlinear approximation theory. It covers Padé approximation theory, embedded-parameters perturbation, Adomian decomposition, homotopy analysis, modified differential transformation, fractal theory, fractional calculus, fractional differential equations, as well as classical numerical techniques for solving nonlinear partial differential equations. In

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addition, 3D modeling and analysis are also covered in-depth. Systematically describes powerful approximation methods to solve nonlinear equations in fluid problems Includes novel developments in fractional order differential equations with fractal theory applied to fluids Features new methods, including Homotopy Approximation, embedded-parameter perturbation, and 3D models and analysis This book presents multivariate time series methods for the analysis and optimal control of feedback systems. Although ships' autopilot systems are considered through the entire book, the methods set forth in this book can be applied to many other complicated, large, or noisy feedback control systems for which it is difficult to derive a model of the entire system based on theory in that subject area. The basic models used in this method are the multivariate autoregressive model with exogenous variables (ARX) model and the radial bases function net-type coefficients ARX model. The noise contribution analysis can then be performed through the estimated autoregressive (AR) model and various types of autopilot systems can be designed through the state-space representation of the models. The marine autopilot systems addressed in this book include optimal controllers for course-keeping motion, rolling reduction controllers with rudder motion, engine governor controllers, noise adaptive autopilots, route-tracking controllers by direct steering, and the reference course-setting approach. The

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methods presented here are exemplified with real data analysis and experiments on real ships. This book is highly recommended to readers who are interested in designing optimal or adaptive controllers not only of ships but also of any other complicated systems under noisy disturbance conditions.

Uncertainty has been of concern to engineers, managers and . scientists for many centuries. In management sciences there have existed definitions of uncertainty in a rather narrow sense since the beginning of this century. In engineering and uncertainty has for a long time been considered as in sciences, however, synonymous with random, stochastic, statistic, or probabilistic. Only since the early sixties views on uncertainty have ~ecome more heterogeneous and more tools to model uncertainty than statistics have been proposed by several scientists. The problem of modeling uncertainty adequately has become more important the more complex systems have become, the faster the scientific and engineering world develops, and the more important, but also more difficult, forecasting of future states of systems have become. The first question one should probably ask is whether uncertainty is a phenomenon, a feature of real world systems, a state of mind or a label for a situation in which a human being wants to make statements about phenomena, i. e. , reality, models, and theories, respectively. One cart also ask whether uncertainty is an objective fact or just a

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subjective impression which is closely related to individual persons. Whether uncertainty is an objective feature of physical real systems seems to be a philosophical question. This shall not be answered in this volume.

Modeling and Analysis of Compositional Data presents a practical and comprehensive introduction to the analysis of compositional data along with numerous examples to illustrate both theory and application of each method. Based upon short courses delivered by the authors, it provides a complete and current compendium of fundamental to advanced methodologies along with exercises at the end of each chapter to improve understanding, as well as data and a solutions manual which is available on an accompanying website.

Complementing Pawlowsky-Glahn's earlier collective text that provides an overview of the state-of-the-art in this field, Modeling and Analysis of Compositional Data fills a gap in the literature for a much-needed manual for teaching, self learning or consulting.

The design, development, analysis, and evaluation of new aircraft technologies such as fly by wire, unmanned aerial vehicles, and micro air vehicles, necessitate a better understanding of flight mechanics on the part of the aircraft-systems analyst. A text that provides unified coverage of aircraft flight mechanics and systems concept will go a lon

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The purpose of this book is first to study MATLAB programming concepts, then the basic concepts of modeling and simulation analysis, particularly focus on digital communication simulation. The book will cover the topics practically to describe network routing simulation using MATLAB tool. It will cover the dimensions' like Wireless network and WSN simulation using MATLAB, then depict the modeling and simulation of vehicles power network in detail along with considering different case studies. Key features of the book include: Discusses different basics and advanced methodology with their fundamental concepts of exploration and exploitation in NETWORK SIMULATION. Elaborates practice questions and simulations in MATLAB Student-friendly and Concise Useful for UG and PG level research scholar Aimed at Practical approach for network simulation with more programs with step by step comments. Based on the Latest technologies, coverage of wireless simulation and WSN concepts and implementations

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