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Computer-Aided Design, Engineering, and Manufacturing - Cornelius T. Leondes 2000-12-12
In the competitive business arena companies must continually strive to create new and better products faster, more efficiently, and more cost effectively than their competitors to gain and keep the competitive advantage. Computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) are now the industry standa

Towards Design Automation for Additive Manufacturing - Anton Wiberg 2019-10-14
In recent decades, the development of computer-controlled manufacturing by adding materiallayer by layer, called Additive Manufacturing (AM), has developed at a rapid pace. The technologyadds possibilities to the manufacturing of geometries that are not possible, or at leastnot economically feasible, to manufacture by more conventional manufacturing methods. AMcomes with the idea that complexity is free, meaning that complex geometries are as expensiveto manufacture as simple geometries. This is partly true, but there remain several design rulesthat needs to be considered before manufacturing. The research field Design for Additive Manufacturing(DfAM) consists of research that aims to take advantage of the possibilities of AMwhile considering the limitations of the technique. Computer Aided technologies (CAx) is the name of the usage of methods and software thataim to support a digital product development process. CAx includes software and methodsfor design, the evaluation of designs, manufacturing support, and other things. The commongoal with all CAx disciplines is to achieve better products at a lower cost and with a shorterdevelopment time. The work presented in this thesis bridges DfAM with CAx with the aim of achieving designautomation for AM. The work reviews the current DfAM process and proposes a new integratedDfAM process that considers the functionality and manufacturing of components. Selectedparts of the proposed process are implemented in a case study in order to evaluate theproposed process. In addition, a tool that supports part of the design process is developed. The proposed design process implements Multidisciplinary Design Optimization (MDO) witha parametric CAD model that is evaluated from functional and manufacturing perspectives. Inthe implementation, a structural component is designed using the MDO framework, which includesComputer Aided Engineering (CAE) models for structural evaluation, the calculation ofweight, and how much support material that needs to be added during manufacturing. Thecomponent is optimized for the reduction of weight and minimization of support material,while the stress levels in the component are constrained. The developed tool uses methodsfor high level Parametric CAD modelling to simplify the creation of parametric CAD modelsbased on Topology Optimization (TO) results. The work concludes that the implementation of CAx technologies in the DfAM process enablesa more automated design process with less manual design iterations than traditional DfAM processes.It also discusses and presents directions for further research to achieve a fully automateddesign process for Additive Manufacturing.

Introduction to Optimum Design - Jasbir Arora 2011-08-12
Introduction to Optimum Design, Third Edition describes an organized approach to engineering design optimization in a rigorous yet simplified manner. It illustrates various concepts and procedures with simple examples and demonstrates their applicability to engineering design problems. Formulation of a design problem as an optimization problem is emphasized and illustrated throughout the text. Excel and MATLAB® are featured as learning and teaching aids. Basic concepts of optimality conditions and numerical methods are described with simple and practical examples, making the material highly teachable and learnable Includes applications of optimization methods for structural, mechanical, aerospace, and industrial engineering problems Introduction to MATLAB Optimization Toolbox Practical design examples introduce students to the use of optimization methods early in the book New example problems throughout the text are enhanced with detailed illustrations Optimum design with Excel Solver has been expanded into a full chapter New chapter on several advanced optimum design topics serves the needs of instructors who teach more advanced courses

Structural Dynamic Systems Computational Techniques and Optimization - Cornelius T. Leondes 1999-02-22
Formulation of an optimal dynamic structural system design problem requires identification of design variables that describe the structural system, a cost function that needs to be minimized, and performance and safety constraints for the system. The formulation of the problem depends upon the type of application and objectives to be achieved, i.e., the shape, the sizing, or topology design problem. Specific design variable definition, cost of function and constraints are dictated by the application. This volume is a comprehensive treatment of the general methods involved in this broadly fundamental problem and provides essential techniques in specific but pervasive structural dynamic systems elements and their optimization.

Handbook of Engineering Systems Design - Anja Maier 2022-07-30
This handbook charts the new engineering paradigm of engineering systems. It brings together contributions from leading thinkers in the field and discusses the design, management and enabling policy of engineering systems. It contains explorations of core themes including technical and (socio-) organisational complexity, human behaviour and uncertainty. The text includes chapters on the education of future engineers, the way in which interventions can be designed, and presents a look to the future. This book follows the emergence of engineering systems, a new engineering paradigm that will help solve truly global challenges. This global approach is characterised by complex sociotechnical systems that are now co-dependent and highly integrated both functionally and technically as well as by a realisation that we all share the same: climate, natural resources, a highly integrated economical system and a responsibility for global sustainability goals. The new paradigm and approach requires the (re)designing of engineering systems that take into account the shifting dynamics of human behaviour, the influence of global stakeholders, and the need for system integration. The text is a reference point for scholars, engineers and policy leaders who are interested in broadening their current perspective on engineering systems design and in devising interventions to help shape societal futures.

Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences - Edmondo Minisci 2018-07-02
This volume presents up-to-date material on the state of the art in evolutionary and deterministic methods for design, optimization and control with applications to industrial and societal problems from Europe, Asia, and America. EUROGEN 2015 was the 11th of a series of International Conferences devoted to bringing together specialists from universities, research institutions and industries developing or applying evolutionary and deterministic methods in design optimization, with emphasis on solving industrial and societal problems. The conference was organised around a number of parallel symposia, regular sessions, and keynote lectures focused on surrogate-based optimization in aerodynamic design, adjoint methods for

steady & unsteady optimization, multi-disciplinary design optimization, holistic optimization in marine design, game strategies combined with evolutionary computation, optimization under uncertainty, topology optimization, optimal planning, shape optimization, and production scheduling.

EBOOK: The Mechanical Design Process - David Ullman 2009-05-16
The fourth edition of The Mechanical Design Process combines a practical overview of the design process with case material and real-life engineering insights. Ullman's work as an innovative designer comes through consistently, and has made this book a favorite with readers. New in this edition are examples from industry and over twenty online templates that help students prepare complete and consistent assignments while learnign the material. This text is appropriate primarily for the Senior Design course taken by mechanical engineering students, though it can also be used in design courses offered earlier in the curriculum. Working engineers also find it to be a readable, practical overview of the modern design process.

Design Science - Vladimir Hubka 2012-12-06
It is the aim of this study to present a framework for the design of technical systems. This can be achieved through a general Design Science, a knowledge system in which products are seen as objects to be developed within engineering design processes. The authors have developed this design science from a division of the knowledge system along two axes. One deals with knowledge about technical systems and design processes while the other presents descriptive statements. Relationships among the various sections of the knowledge system are made clear. Well-known insights into engineering design, the process, its management and its products are placed into new contexts. Particular attention is given to various areas of applicability. Widespread use throughout is made of easily assimilated diagrams and models.

The Mechanical Design Process - David G. Ullman 2003
Publisher Description

Structural Design Optimization Considering Uncertainties - Yannis Tsompanakis 2008-02-07
Uncertainties play a dominant role in the design and optimization of structures and infrastructures. In optimum design of structural systems due to variations of the material, manufacturing variations, variations of the external loads and modelling uncertainty, the parameters of a structure, a structural system and its environment are not given, fi

Innovations in Design & Decision Support Systems in Architecture and Urban Planning - Jos P. Leeuwen, van 2006-09-21
Traditionally, the DDSS conferences aim to be a platform for both starting and experienced researchers who focus on the development and application of computer support in urban planning and architectural design. This volume contains 31 peer reviewed papers from this year's conference. This book will bring researchers together and is a valuable resource for their continuous joint effort to improve the design and planning of our environment.

Engineering Design Optimization - Joaquim R. R. A. Martins 2021-11-18
Based on course-tested material, this rigorous yet accessible graduate textbook covers both fundamental and advanced optimization theory and algorithms. It covers a wide range of numerical methods and topics, including both gradient-based and gradient-free algorithms, multidisciplinary design optimization, and uncertainty, with instruction on how to determine which algorithm should be used for a given application. It also provides an overview of models and how to prepare them for use with numerical optimization, including derivative computation. Over 400 high-quality visualizations and numerous examples facilitate understanding of the theory, and practical tips address common issues encountered in practical engineering design optimization and how to address them. Numerous end-of-chapter homework problems, progressing in difficulty, help put knowledge into practice. Accompanied online by a solutions manual for instructors and source code for problems, this is ideal for a one- or two-semester graduate course on optimization in aerospace, civil, mechanical, electrical, and chemical engineering departments.

Materials Selection in Mechanical Design - Michael F. Ashby 2010-10-29
Understanding materials, their properties and behavior is fundamental to engineering design, and a key application of materials science. Written for all students of engineering, materials science and design, this book describes the procedures for material selection in mechanical design in order to ensure that the most suitable materials for a given application are identified from the full range of materials and section shapes available. Extensively revised for this fourth edition, Materials Selection in Mechanical Design is recognized as one of the leading materials selection texts, and provides a unique and genuinely innovative resource. Features new to this edition * Material property charts now in full color throughout * Significant revisions of chapters on engineering materials, processes and process selection, and selection of material and shape while retaining the book's hallmark structure and subject content * Fully revised chapters on hybrid materials and materials and the environment * Appendix on data and information for engineering materials fully updated * Revised and expanded end-of-chapter exercises and additional worked examples Materials are introduced through their properties; materials selection charts (also available on line) capture the important features of all materials, allowing rapid retrieval of information and application of selection techniques. Merit indices, combined with charts, allow optimization of the materials selection process. Sources of material property data are reviewed and approaches to their use are given. Material processing and its influence on the design are discussed. New chapters on environmental issues, industrial engineering and materials design are included, as are new worked examples, exercise materials and a separate, online Instructor's Manual. New case studies have been developed to further illustrate procedures and to add to the practical implementation of the text. * The new edition of the leading materials selection text, now with full color material property charts * Includes significant revisions of chapters on engineering materials, processes and process selection, and selection of material and shape while retaining the book's hallmark structure and subject content * Fully revised chapters on hybrid materials and materials and the environment * Appendix on data and information for engineering materials fully updated * Revised and expanded end-of-chapter exercises and additional worked examples

Exergy, Energy System Analysis and Optimization - Volume III - Christos A. Frangopoulos 2009-05-13
Exergy, Energy System Analysis, and Optimization theme is a component of the Encyclopedia of Energy Sciences, Engineering and Technology Resources which is part of the global Encyclopedia of Life Support Systems (EOLSS), an integrated compendium of twenty one Encyclopedias. These three volumes are organized into five different topics which represent the main scientific areas of the theme: 1. Exergy and Thermodynamic Analysis; 2. Thermoeconomic Analysis; 3. Modeling, Simulation and Optimization in Energy Systems; 4. Artificial Intelligence and Expert Systems in Energy Systems Analysis; 5. Sustainability Considerations in the Modeling of Energy Systems. Fundamentals and applications of characteristic methods are presented in these volumes. These three volumes are aimed at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Optimization in Practice with MATLAB® - Achille Messac 2015-03-19
Optimization in Practice with MATLAB® provides a unique approach to optimization education. It is accessible to both junior and senior undergraduate and graduate students, as well as industry practitioners. It provides a strongly practical perspective that allows the student to be ready to use optimization in the workplace. It covers traditional materials, as well as important topics previously unavailable in optimization books (e.g. numerical essentials - for successful optimization). Written with both the reader and the instructor in mind, Optimization in Practice with MATLAB® provides practical applications of real-world problems using MATLAB®, with a suite of practical examples and exercises that help the students link the theoretical, the analytical, and the computational in each chapter. Additionally, supporting MATLAB® m-files are available for download via www.cambridge.org.messac. Lastly, adopting instructors will receive a comprehensive solution manual with solution codes along with lectures in PowerPoint with animations for each chapter, and the text's unique flexibility enables instructors to structure one- or two-semester courses.

Flow-Based Optimization of Products or Devices - Nils Tångefjord Basse 2020-11-13
Flow-based optimization of products and devices is an immature field compared to the corresponding topology optimization based on solid mechanics. However, it is an essential part of component development with both internal and/or external flow. The aim of this book is two-fold: (i) to provide state-of-the-art examples of flow-based optimization and (ii) to present a review of topology optimization for fluid-based problems.

Introduction to Optimum Design - Jasbir Arora 2011-08-17

Introduction to Optimum Design is the most widely used textbook in engineering optimization and optimum design courses. It is intended for use in a first course on engineering design and optimization at the undergraduate or graduate level within engineering departments of all disciplines, but primarily within mechanical, aerospace and civil engineering. The basic approach of the text is to describe an organized approach to engineering design optimization in a rigorous yet simplified manner, illustrate various concepts and procedures with simple examples, and demonstrate their applicability to engineering design problems. Formulation of a design problem as an optimization problem is emphasized and illustrated throughout the text. Excel and MATLAB are featured throughout as learning and teaching aids. The 3rd edition has been reorganized and enhanced with new material, making the book even more appealing to instructors regardless of the level they teach the course. Examples include moving the introductory chapter on Excel and MATLAB closer to the front of the book and adding an early chapter on practical design examples for the more introductory course, and including a final chapter on advanced topics for the purely graduate level course. Basic concepts of optimality conditions and numerical methods are described with simple and practical examples, making the material highly teachable and learnable. Applications of the methods for structural, mechanical, aerospace and industrial engineering problems. Introduction to MATLAB Optimization Toolbox. Optimum design with Excel Solver has been expanded into a full chapter. Practical design examples introduce students to usage of optimization methods early in the book. New material on several advanced optimum design topics serves the needs of instructors teaching more advanced courses.
Optimal Design of Piping Systems for District Heating -

Progress In Astronautics and Aeronautics - Manohar P. Kamat 1993

Advanced Aerospace Materials - Haim Abramovich 2019-08-19
Advanced Aerospace Materials is intended for engineers and students of aerospace, materials, and mechanical engineering. It covers the transition from aluminum to composite materials for aerospace structures and will include essential and advanced analyses used in today's aerospace industries. Various aspects of design, failure and monitoring of structural components will be derived and presented accompanied by relevant formulas and analyses.
Artificial Intelligence in Design '92 - John S. Gero 2012-12-06
Design has now become an important research topic in engineering and architecture. Design is one of the keystones to economic competitiveness and the fundamental precursor to manufacturing. The development of computational models founded on the artificial intelligence paradigm has provided an impetus for current design research. This volume contains contributions from the Second International Conference on Artificial Intelligence in Design held in June 1992 in Pittsburgh. They represent the state-of-the-art and the cutting edge of research and development in this field. They are of particular interest to researchers, developers and users of computer systems in design. This volume demonstrates both the breadth and depth of artificial intelligence in design and points the way forward for our understanding of design as a process and for the development of computer-based tools to aiddesigners.
Emerging Methods for Multidisciplinary Optimization - Jan Blachut 2001-06-19
This volume provides an up-to-date overview of major advances, emerging trends, and projected industrial applications in the field of multidisciplinary optimization. It concentrates on the current status of the field, exposes commonalities, innovative, promising, and speculative methods. This book provides a view of today's multidisciplinary optimization environment through a balenced theoretical and practical treatment. The contributors are the foremost authorities in each area of specialisation.
Design Automation Methods and Tools for Microfluidics-Based Biochips - Jun Zeng 2006-11-08
Design Automation Methods and Tools for Microfluidics-Based Biochips deals with all aspects of design automation for microfluidics-based biochips. Experts have contributed chapters on many aspects of biochip design automation. Topics covered include: device modeling; adaptation of bioassays for on-chip implementations; numerical methods and simulation tools; architectural synthesis, scheduling and binding of assay operations; physical design and module placement; fault modeling and testing; and reconfiguration methods.

Principles of Optimal Design - Panos Y. Papalambros 2000-07-10
Thorough, practical coverage of latest development in optimization theory and practice.
Research into Design for a Connected World - Amaresh Chakrabarti 2019-01-08
This book showcases cutting-edge research papers from the 7th International Conference on Research into Design (ICoRD 2019) – the largest in India in this area – written by eminent researchers from across the world on design processes, technologies, methods and tools, and their impact on innovation, for supporting design for a connected world. The theme of ICoRD'19 has been "Design for a Connected World". While Design traditionally focused on developing products that worked on their own, an emerging trend is to have products with a smart layer that makes them context aware and responsive, individually and collectively, through collaboration with other physical and digital objects with which these are connected. The papers in this volume explore these themes, and their key focus is connectivity: how do products and their development change in a connected world? The volume will be of interest to researchers, professionals and entrepreneurs working in the areas on industrial design, manufacturing, consumer goods, and industrial management who are interested in the use of emerging technologies such as IOT, IIOT, Digital Twins, I4.0 etc. as well as new and emerging methods and tools to design new products, systems and services.
Optimization of Finite Dimensional Structures - Makoto Ohsaki 2016-04-19
Originally developed for mechanical and aeronautical engineering, structural optimization is not so easily applied to civil and architectural engineering, as structures in these fields are not mass products, but more often unique structures planned in accordance with specific design requirements. The shape and geometry of such structures are determined by a designer or an architect in view of nonstructural performance that includes aesthetics. Until now, books in this area gave little help to engineers working in cooperation with designers, as they covered conceptual material with little consideration of civil engineering applications, or they required a solid background in applied mathematics and continuum mechanics, an area not usually studied by practicing engineers and students in civil engineering. Optimization of Finite Dimensional Structures introduces methodologies and applications that are closely related to design problems encountered in structural optimization, to serve as a bridge between the communities of structural optimization in mechanical engineering and the researchers and engineers in civil engineering. This unparalleled, self-contained work: Provides readers with the basics of optimization of frame structures, such as trusses, building frames, and long-span structures, with descriptions of various applications to real-world problems Summarizes the historical development of methodologies and theorems on optimization of frame structures Introduces many recently developed highly efficient optimization techniques presented with illustrative examples Describes traditional problems with constraints on limit loads, member stresses, compliance, and eigenvalues of vibration, all in detail Offers a unique look at optimization results for spatial trusses and latticed domes Mathematical preliminaries and methodologies are summarized in the book's appendix, so that readers can attend to the details when needed without having to wade through tedious mathematics in the explanatory main chapters. Instead, small examples that can be solved by hand or by using a simple program are presented in these chapters, making the book readily accessible and highly useful for both classroom use and professional self-study.
Evolutionary Multi-Criterion Optimization - Ricardo H.C. Takahashi 2011-03-14
This book constitutes the refereed proceedings of the 6th International Conference on Evolutionary Multi-Criterion Optimization, EMO 2011, held in Ouro Preto, Brazil, in April 2011. The 42 revised full papers presented were carefully reviewed and selected from 83 submissions. The papers deal with fundamental questions of EMO theory, such as the development of algorithmically efficient tools for the evaluation of solution-set quality , the theoretical questions related to solution archiving and others. They report on the continuing effort in the development of algorithms, either for dealing with particular classes of problems or for new forms of processing the problem information. Almost one third of the papers is related to EMO applications in a diversity of fields. Eleven papers are devoted to promote the interaction with the related field of Multi-Criterion Decision Making (MCDM).
Discretization Methods and Structural Optimization — Procedures and Applications - Hans A. Eschenauer 2012-12-06
In recent years, the Finite Element Methods FEM were more and more employed in development and

design departments as very fast working tools in order to determine stresses, deformations, eigenfrequencies etc. for all kinds of constructions under complex loading conditions. Meanwhile. very effective software systems have been developed by various research teams although some mathematical problems (e. g. convergence) have not been solved satisfac torily yet. In order to make further advances and to find a common language between mathe maticians and mechanicians the "Society for Applied Mathematics and Mechanics" (GAMM) agreed on the foundation of a special Committee: "Discretization Methods in Solid Mechanics" focussing on the following problems: - Structuring of various methods (displacement functions, hybrid and mixed approaches, etc. >, - Survey of approach functions (Lagrange-/Hermite-polynominals, Spline-functions), - Description of singularities, - Convergence and stability, - Practical and theoretical optimality to all mentioned issues (single and interacting). One of the basic aims of the GAMM-Committee is the interdisciplinary cooperation between mechanicians, mathematicians, and users which shall be intensified. Thus, on September 22, 1985 the committee decided to hold a seminar on "Structural Optimization" in order to allow an exchange of experiences and thoughts between the experts of finite element methods and those of structural optimization. A GAMM-seminar entitled "Discretization Methods and Structural Optimization - Procedures and Applications" was hold on October 5-7, 1988 at the Unversity of Siegen.

Computational Methods and Experimental Measurements XX - S. Hernández 2021-07-26
Formed of papers presented at the 20th International Conference on Computational Methods and Experimental Measurements, this volume provides a view of the latest work on the interaction between computational methods and experiments. The continuous improvement in computer efficiency, coupled with diminishing costs and the rapid development of numerical procedures have generated an ever-increasing expansion of computational simulations that permeate all fields of science and technology. As these procedures continue to grow in magnitude and complexity, it is essential to validate their results to be certain of their reliability. This can be achieved by performing dedicated and accurate experiments, which have undergone constant and enormous development. At the same time, current experimental techniques have become more complex and sophisticated so that they require the intensive use of computers, both for running experiments as well as acquiring and processing the resulting data. Some of the subject areas covered are Fluid flow studies and experiments; Structural and stress analysis; Materials characterization; Electromagnetic problems; Structural integrity; Destructive and non-destructive testing; Heat transfer and thermal processes; Advances in computational methods; Automotive applications; Aerospace applications; Ocean engineering and marine structures; Fluid-structure interaction; Bio-electromagnetics; Process simulations; Environmental monitoring, modelling and applications; Validation of computer modelling; Data and signal processing; Virtual testing and verification; Electromagnetic compatibility; Life cycle assessment.

26th European Symposium on Computer Aided Process Engineering - 2016-06-17
26th European Symposium on Computer Aided Process Engineering contains the papers presented at the 26th European Society of Computer-Aided Process Engineering (ESCAPE) Event held at Portorož Slovenia, from June 12th to June 15th, 2016. Themes discussed at the conference include Process-product Synthesis, Design and Integration, Modelling, Numerical analysis, Simulation and Optimization, Process Operations and Control and Education in CAPE/PSE. Presents findings and discussions from the 26th European Society of Computer-Aided Process Engineering (ESCAPE) Event

Infranomics - Adrian V. Gheorghe 2013-12-03
This book provides a rough entry into the interdisciplinary field of Infranomics. It enables better decision making in an increasing ambiguous, complex, emergent, interdependent, and uncertain world where we attempt to anticipate modern society trends and patterns in order to react appropriately. However, as with any emerging discipline, much research is needed at the applications and conceptual level. The applications level may require development and testing of methods, tools, and techniques to enable analysis and decision-making in ambiguous, complex, emergent, interdependent, and uncertain conditions while the conceptual level may require taping into driving philosophies, theories, and methodologies that form the basis for Infranomics. Striking the right balance between applications and conceptual foundation (theory) requires rigorous research. This book provides a springboard for robust discussions on applications, theory,

and transformation of current thinking to better deal with modern society's problematic issues using Infranomics.

Model-Based Design of Adaptive Embedded Systems - Twan Basten 2013-03-15
This book describes model-based development of adaptive embedded systems, which enable improved functionality using the same resources. The techniques presented facilitate design from a higher level of abstraction, focusing on the problem domain rather than on the solution domain, thereby increasing development efficiency. Models are used to capture system specifications and to implement (manually or automatically) system functionality. The authors demonstrate the real impact of adaptivity on engineering of embedded systems by providing several industrial examples of the models used in the development of adaptive embedded systems.

Thermodynamic Optimization of Complex Energy Systems - Adrian Bejan 1999-07-31
A comprehensive assessment of the methodologies of thermodynamic optimization, exergy analysis and thermoeconomics, and their application to the design of efficient and environmentally sound energy systems. The chapters are organized in a sequence that begins with pure thermodynamics and progresses towards the blending of thermodynamics with other disciplines, such as heat transfer and cost accounting. Three methods of analysis stand out: entropy generation minimization, exergy (or availability) analysis, and thermoeconomics. The book reviews current directions in a field that is both extremely important and intellectually alive. Additionally, new directions for research on thermodynamics and optimization are revealed.

Handbook of Neural Computation - Pijush Samui 2017-07-18
Handbook of Neural Computation explores neural computation applications, ranging from conventional fields of mechanical and civil engineering, to electronics, electrical engineering and computer science. This book covers the numerous applications of artificial and deep neural networks and their uses in learning machines, including image and speech recognition, natural language processing and risk analysis. Edited by renowned authorities in this field, this work is comprised of articles from reputable industry and academic scholars and experts from around the world. Each contributor presents a specific research issue with its recent and future trends. As the demand rises in the engineering and medical industries for neural networks and other machine learning methods to solve different types of operations, such as data prediction, classification of images, analysis of big data, and intelligent decision-making, this book provides readers with the latest, cutting-edge research in one comprehensive text. Features high-quality research articles on multivariate adaptive regression splines, the minimax probability machine, and more Discusses machine learning techniques, including classification, clustering, regression, web mining, information retrieval and natural language processing Covers supervised, unsupervised, reinforced, ensemble, and nature-inspired learning methods

Optimal Design of Experiments - Peter Goos 2011-06-28
"This is an engaging and informative book on the modern practice of experimental design. The authors' writing style is entertaining, the consulting dialogs are extremely enjoyable, and the technical material is presented brilliantly but not overwhelmingly. The book is a joy to read. Everyone who practices or teaches DOE should read this book." - Douglas C. Montgomery, Regents Professor, Department of Industrial Engineering, Arizona State University "It's been said: 'Design for the experiment, don't experiment for the design.' This book ably demonstrates this notion by showing how tailor-made, optimal designs can be effectively employed to meet a client's actual needs. It should be required reading for anyone interested in using the design of experiments in industrial settings." —Christopher J. Nachtsheim, Frank A Donaldson Chair in Operations Management, Carlson School of Management, University of Minnesota This book demonstrates the utility of the computer-aided optimal design approach using real industrial examples. These examples address questions such as the following: How can I do screening inexpensively if I have dozens of factors to investigate? What can I do if I have day-to-day variability and I can only perform 3 runs a day? How can I do RSM cost effectively if I have categorical factors? How can I design and analyze experiments when there is a factor that can only be changed a few times over the study? How can I include both ingredients in a mixture and processing factors in the same study? How can I design an experiment if there are many factor combinations that are impossible to run? How can I make sure that a time trend due

to warming up of equipment does not affect the conclusions from a study? How can I take into account batch information in when designing experiments involving multiple batches? How can I add runs to a botched experiment to resolve ambiguities? While answering these questions the book also shows how to evaluate and compare designs. This allows researchers to make sensible trade-offs between the cost of experimentation and the amount of information they obtain.

Modular System Design and Evaluation - Mark Sh. Levin 2014-09-06
This book examines seven key combinatorial engineering frameworks (composite schemes consisting of algorithms and/or interactive procedures) for hierarchical modular (composite) systems. These frameworks are based on combinatorial optimization problems (e.g., knapsack problem, multiple choice problem, assignment problem, morphological clique problem), with the author's version of morphological design approach – Hierarchical Morphological Multicritieria Design (HMMD) – providing a conceptual lens with which to elucidate the examples discussed. This approach is based on ordinal estimates of design alternatives for systems parts/components, however, the book also puts forward an original version of HMMD that is based on new interval multiset estimates for the design alternatives with special attention paid to the aggregation of modular solutions (system versions). The second part of 'Modular System Design and Evaluation' provides ten information technology case studies that enriches understanding of the design of system design, detection of system bottlenecks and system improvement, amongst others. The book is intended for researchers and scientists, students, and practitioners in many domains of information technology and engineering. The book is also designed to be used as a text for courses in system design, systems engineering and life cycle engineering at the level of undergraduate level, graduate/PhD levels, and for continuing education. The material and methods contained in this book were used over four years in Moscow Institute of Physics and Technology (State University) in the author's faculty course "System Design".

Wireless Transceiver Systems Design - Wolfgang Eberle 2008-06-17
The fields of communication, signal processing, and embedded systems and circuits are brought together in this book. These fields come together with a single design goal, a WLAN transceiver which combines analog and digital design, VLSI and systems design, algorithms and architectures, as well as design and CAD/EDA. This book focuses on the overall approach to design problems and design organization needed for transceiver design. It does not focus on one particular standard.

Design Optimization using MATLAB and SOLIDWORKS - Krishnan Suresh 2021-04-29
A unique text integrating numerics, mathematics and applications to provide a hands-on approach to using optimization techniques, this mathematically accessible textbook emphasises conceptual understanding and importance of theorems rather than elaborate proofs. It allows students to develop fundamental optimization methods before delving into MATLAB®'s optimization toolbox, and to link MATLAB's results with the results from their own code. Following a practical approach, the text demonstrates several applications, from error-free analytic examples to truss (size) optimization, and 2D and 3D shape optimization, where numerical errors are inevitable. The principle of minimum potential energy is discussed to highlight the deep relationship between engineering and optimization. MATLAB code in every chapter illustrates key concepts and the text demonstrates the coupling between MATLAB and SOLIDWORKS® for design optimization. A wide variety of optimization problems are covered including constrained non-linear, linear-programming, least-squares, multi-objective, and global optimization problems.

Interdisciplinary Design: Proceedings of the 21st CIRP Design Conference -

Analytic Methods for Design Practice - Gyung-Jin Park 2007-05-31
In the world of modern engineering, rigorous and definite design methodologies are needed. However, many parts of engineering design are performed in either an ad-hoc manner or based on the intuition of the engineer. This is the first book to look at both stages of the design process – conceptual design and detailed design – and detail design methodologies for every step of the design process. Case studies show how practical design problems can be solved with analytic design methods. This book is an excellent introduction to the subject. The book's practical focus will make the book useful to practicing engineers as a practical handbook of design.