Engineering Applications in Sustainable Design and Development

Bradley Striebig 2015-01-01 ENGINEERING APPLICATIONS IN SUSTAINABLE DESIGN AND DEVELOPMENT is an invaluable resource for today's engineering student. Focusing on pressing contemporary issues, the text puts product design in the context of models of sustainability. Relevant case studies from across the globe will be of interest to engineers in training, and active learning exercises in each chapter help students learn to apply theory to real-world situations. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Sustainability in Engineering Design
Anthony Johnson 2014-02-11 Designed for use in engineering design courses, and as a reference for industry professionals learning sustainable design concepts and practical methods, Sustainability in Engineering Design focuses on designers as the driving force behind sustainable products. This book introduces sustainability concepts and explains the application of sustainable methods to the engineering design process. The book also covers important design topics such as project and team management, client management, performance prediction, and the social and environmental effects of sustainable engineering design. These concepts and methods are supported with a wealth of worked examples, discussion questions, and primary case studies to aid comprehension. Applies research-based methods to achieve real-world results for rapidly evolving industry trends. Focuses on design engineers as the starting point of creating sustainable design. Provides practical methods and design tools to guide engineers designers in creating sustainably designed and engineering products. Incorporates all aspects of sustainable engineering design, including the material selection, production, and marketing of products. Includes cutting-edge sustainable design model case studies based on the authors' research and experiences.

Sustainable Design
Daniel A. Valler 2008-04-25 Scientific Principles to Guide Sustainable Design Decisions From thermodynamics to fluid dynamics to computational chemistry, this book sets forth the scientific principles underlying the need for sustainable design, explaining not just the "how" of sustainable design and green engineering, but also the "whys." Moreover, it provides readers with the scientific principles needed to guide their own sustainable design decisions. Throughout the book, the authors draw from their experience in architecture, civil engineering, environmental engineering, planning, and public policy in order to build an understanding of the interdisciplinary nature of sustainable design. Written to enable readers to take a more scientific approach to sustainable design, the book offers many practical features, including: Case studies presenting the authors' firsthand accounts of actual green projects Lessons learned from Duke University's Smart House Program that demonstrate the concepts and techniques discussed in the book Exercises that encourage readers to use their newfound knowledge to solve green design problems Figures, tables, and sidebars illustrating key concepts and summarizing important points.

Pursuing Sustainability
Chalain Chen 2021-03-03 This handbook includes three parts, corresponding to the following three domains of OR/MS research related to sustainability: (i) Systems Design, Innovation, and Technology, (ii) Manufacturing, Logistics, and Transportation, and (iii) Sustainable Natural Resource Management. The first part of the handbook (Chapters 2-6) will focus on the creation and development of sustainable products, services, value chains, and organizations from a systems perspective. Key areas to be covered include Green Design & Innovation, Technology and Engineering Management, Sustainable Value Chain Systems, Sustainability Standards and Performance Evaluation, and Circular Economy and New Research Directions in Sustainability. The second part of the handbook (Chapters 7-11) will concentrate on the major operational and logistic issues faced by today's industries in pursuing sustainability. Key areas to be covered include Remanufacturing, Reverse Logistics, Closed-Loop Supply Chains, Sustainable Transportation, and New Research Directions in Green Supply Chain Management. The third part of the proposed handbook (Chapters 12-16) will center on major sustainability issues in managing engineering infrastructure and natural resources. Key areas to be covered include Renewable Energy, Sustainable Water Resource, Biofuel Infrastructure, Natural Gas, and New Research Direction in Sustainable Resource Management. The handbook aims to bridge the three main OR/MS research domains in sustainability: “Systems Design, Innovation, and Technology,” “Manufacturing, Logistics, and Transportation,” and “Sustainable Natural Resource Management.” Traditionally, these domains are treated separately in the OR/MS literature. By combining the three domains, the handbook will provide a more holistic treatment of MS/OR methodologies to address critical sustainability issues faced by today’s society. Unlike most existing handbooks which only focus on current OR/MS research in sustainability within a domain, this handbook will include a concluding chapter in each of the three parts to discuss and identify potential future research directions in each of the three main domains.

Sustainable Design Through Process Integration
Mahmoud M. El-Halwagi 2017-08-08 Sustainable Design through Process Integration: Fundamentals and Applications to Industrial Pollution Prevention, Resource Conservation, and Profitability Enhancement, Second Edition, is an important textbook that provides authoritative, comprehensive, and easy-to-follow coverage of the fundamental concepts and practical techniques on the use of process integration to maximize the efficiency and sustainability of industrial processes. The book is ideal for adoption in process design and sustainability courses. It is also a valuable guidebook to process, chemical, and environmental engineers who need to improve the design, operation, performance, and sustainability of industrial plants. The book covers pressing and high growth topics, including benchmarking process performance, identifying root causes of problems and opportunities for improvement, designing integrated solutions, enhancing profitability, conserving natural resources, and preventing pollution. Written by one of the world’s foremost authorities in integrated process design and sustainability, the new edition contains new chapters and updated material focused on key aspects of process integration and sustainable design. The new edition is also packed with numerous new examples and industrial applications. Allows the reader to methodically develop rigorous targets that benefit both performance of industrial processes and develop cost-effective implementations. Contains state-of-the-art process integration and improvement approaches and techniques including graphical, algebraic, and mathematical methods. Covers topics and applications that include profitability enhancement, mass and energy conservation, synthesis of
innovative processes, retrofitting of existing systems, design and assessment of water, energy, and water-energy-nexus systems, and reconciliation of various sustainability objectives.

**Design and Technological Applications in Sustainable Architecture**

Stephen Siu Yu Lau 2021-10-19 This volume discusses the climate responsiveness of sustainable architecture design and technology in China, Japan, Singapore, Korea, and other Southeast Asian countries. It presents concepts and applications in urban planning, building design, and structural performance evaluation. The four sections of the text cover the theory and implementation of sustainable architecture within various geographic boundaries and contexts, offering an interdisciplinary assessment of the challenges faced at different climate zones. The main topics covered are: 1) urban ecological restoration under the influence of climate environment; 2) health and human considerations of building and environment; 3) prototype optimization of sustainable building; and 4) feedback of building performance and design evaluation. The book is intended to be a contribution to the growing body of knowledge on sustainable architecture for applicable use by practitioners, city planners, field researchers, and building operators in building design, construction, usage, operation, and maintenance.

**Sustainable Design and Build**

Md. Faruque Hossain 2019-08-17 Sustainable Design and Build provides a complete reference for engineers and scientists who want to conduct sustainability research. The book begins with a rudimentary discussion of environmental pollution and energy that is followed by their applications for solving problems in construction processes and practices governing advanced building design, infrastructure and transportation, and water and sewage. Other topics include engineering invisible roads and bridges to start building intelligent modeling, energy modeling, resilience in urban and rural development, engineering invisible roads and bridges, zero emission vehicles and flying transportation technology. This book presents a valuable guide to sustainable design and construction processes and methods. Covers the latest research in the utilization of renewable energy and the implementation in construction and building system design. Includes a detailed discussion on combined technology applications of energy, gas and water covers advanced methods and technologies for constructing sustainable transportation systems, including roads, bridges, tunnels and hardscapes.

**Sustainable Engineering**

Krishna R. Reddy 2019-04-22 Comprehensively covers the definition, methodology, and current applications of the principles of sustainability and resilience in every engineering discipline. This book contains detailed information about sustainability and resiliency principles and applications in engineering practice, and provides information on how to use scientific tools for sustainability assessment that help engineers select the best alternative for each project or activity. Logically organized around the three pillars of sustainability—environment, economy, and society—it is a primary resource for students and professionals alike. Drivers, Metrics, Tools, and Applications offers numerous ways to help engineers contribute towards global sustainable development while solving some of the grand challenges the world is facing today. The first part of the book covers the environmental, economic, and social impacts associated with project/product development as well as society as a whole. This is followed by a section devoted to sustainability metrics and assessment tools, which includes material flow analysis and material budget, carbon footprint analysis, life cycle assessment, environmental health risk assessment, and more. Next comes an in-depth examination of sustainable engineering practices, including sustainable energy engineering, sustainable waste management, and green and sustainable buildings. The book concludes with a look at how sustainable engineering may be applied to different engineering (i.e. environmental, chemical, civil, materials, infrastructure) projects. Some of the key features of this book include the following: Provides a complete and sensible understanding of the important concepts of sustainability, resiliency, and sustainable engineering Offers detailed explanations of sustainable engineering practices in waste management and remediation of contaminated soils, civil construction and infrastructure, and climate geoengineering Presents a set of case studies across different engineering disciplines such as bio/chemical, environmental, materials, construction, and infrastructure engineering that demonstrate the practical applicability of sustainability assessment tools to diverse projects Includes lessons at the end of each chapter as well as other interdisciplinary researchers with the techniques needed to design, implement, and test for sustainability and health promotion in new or existing structures.

**Applications in Design and Simulation of Sustainable Chemical Processes**

Alexandre C. Dimian 2019-08-08 Applications in Design and Simulation of Sustainable Chemical Processes addresses the challenging applications in designing eco-friendly but efficient chemical processes, including recent advances in chemistry and catalysis that rely on renewable raw materials. Grounded in the fundamental knowledge of chemistry, thermodynamics, chemical reaction engineering and unit operations, this book is an indispensable resource for developing and designing innovating chemical processes by employing computer simulations as an efficient conceptual tool. Targeted to graduate and post graduate students in chemical engineering, as well as to professionals, the book aims to advance their skills in process innovation and conceptual design. The work completes the book Integrated Design and Simulation of Chemical Processes by Elsevier (2014) authored by the same team. Includes comprehensive case studies of innovative processes based on renewable raw materials Outlines Process Systems Engineering approach with emphasis on systematic design methods Emphasizes steady-state and dynamic process simulation as problem analysis and flowsheet creation tool Applies modern concepts, as process integration and intensification, for enhancing the sustainability.

**Sustainable Infrastructure**

S. Bry Sarte 2010-09-23 As more factors, perspectives, and metrics are incorporated into the planning and building process, the roles of engineers and designers are increasingly being fused together. Sustainable Infrastructure explores this trend with in-depth look at sustainable engineering practices in an urban design as it involves watershed master-planning, green building, optimizing water reuse, reclaiming urban spaces, green streets initiatives, and sustainable master-planning. This complete guide provides guidance on the role of creative thinking and collaborative team-building in meeting solutions needed to affect a sustainable transformation of the built environment.

**Sustainable Development in Practice**

Adisa Azapagic 2004-07-23 This book addresses the need for a broad understanding of the concepts of sustainable development (environmental, social and economic aspects) and presents a series of practical case studies on such topics as waste management, air quality, solid waste management and renewable energy.

**Sustainable Environmental Design in Architecture**

Stamatina Tb. Rassia 2012-02-02 Over the last few decades, there have been dramatic improvements in the understanding and research of environmental design. Numerous methods have been developed to enhance architectural design in order for it to be more energy efficient, sustainable and health enhancing. This book presents several theories and techniques that can be used to improve how buildings are constructed and designed. The focus here is on more sustainable construction methods while promoting the health of the building's occupants. Contributions to the study of environmental design have come from a diversity of fields including applied mathematics, optimization, computer science, medical research, psychology, management science, architecture, and engineering. The techniques developed in these areas of research can be used to increase building performance, improve satisfaction, productivity, and well being, and reducing the incidence of health conditions and chronic diseases related to the use of a designed space. This book provides architectural practitioners, civil engineers as well as other interdisciplinary researchers with the techniques needed to design, implement, and test for sustainability and health promotion in new or existing structures.

**Process Intensification and Integration for Sustainable Design**

Dominic C. Y. Foo 2021-02-16 Presents comprehensive coverage of process intensification and integration for sustainable design, with its fundamental techniques and experiences from the industry. Drawing from fundamental techniques and recent industrial experiences, this book discusses the many developments in process intensification and integration and focuses on increasing sustainability via several overarching topics such as Sustainable Manufacturing, Energy Saving Technologies, and Resource Conservation and Pollution Prevention Techniques. Process Intensification and Integration for Sustainable Design starts discussions on: shaft gas as an option for the production of chemicals and challenges for process intensification; the design and techno-economic analysis of separation units to handle feedstock variability in shaft gas treatment; RO-PRO desalination; and techno-economic environmental and economic assessment of ultrathin polyamide membranes for oxygen-enriched combustion. Next, it looks at process intensification of membrane-based systems for water, energy, and environment applications; the design of internally heat-integrated distillation column (HIDIC); and graphical analysis and integration of heat exchanger networks with heat pumps. Decomposition and implementation
of large-scale interplant heat integration is covered, as is the synthesis of combined heat and mass exchange networks (CHAMENs) with renewables.

The book also covers integrating and designing and improving housing complexes; a sustainable biomass conversion process assessment; and more. Covers the many advances and changes in process intensification and integration Provides side-by-side discussions of fundamental techniques and recent industrial experiences to guide practitioners in their own processes Presents comprehensive coverage of topics relevant, among others, to the process industry, bioenergy, and plant energy management. Offers insightful analysis and integration of reactor and heat exchanger network. Looks at optimization of integrated water and multi-regenerator membrane systems involving multi-contaminants Process Intensification and Integration for Sustainable Design is an ideal book for process engineers, chemical engineers, engineering scientists, engineering consultants, and chemists.

Sustainable Engineering- David T. Allen and David R. Shonnard 2011-12-28 Assessing Engineering Designs for Environmental, Economic, and Social Impact Engineers will play a central role in addressing one of the twenty-first century’s key challenges: the development of new technologies that address societal needs and wants within the constraints imposed by limited natural resources and the need to protect environmental systems. To create tomorrow’s sustainable products, engineers must carefully consider environmental, economic, and social factors in evaluating their designs.

Fortunately, quantitative tools for incorporating sustainability concepts into engineering designs and performance metrics are now emerging. Sustainable Engineering introduces these tools and shows how to apply them. Building on widely accepted principles they first introduced in Green Engineering, David T. Allen and David R. Shonnard discuss key aspects of designing sustainable systems in any engineering discipline. Their powerful, unified approach to environmental, economic, and social sustainability assessment in the early stage of chemical products’ initiating, this book provides innovative, novel and comprehensive chemical engineers, researchers, students, practitioners and consultants in sustainable systems development and commercialization.

Bioreactors- Lakhveer Singh 2020-04 Bioreactors: Sustainable Design and Industrial Applications in Mitigation of GHG Emissions presents and compares the foundational concepts, state-of-the-art design and fabrication of bioreactors. Solidly based on theoretical fundamentals, the book examines various aspects of the commercially available bioreactors, such as construction and fabrication, design, modeling and simulation, development, operation, maintenance, management and target applications for biofuels production and bio-waste management. Emerging issues in commercial feasibility are explored, concepts and pathways for upscaling, and techno-economic assessment are also covered. This book provides researchers and engineers in the biofuels and waste management sectors a clear, at-a-glance understanding of the actual potential of different advanced bioreactors for their requirements. It is a must-have reference for better-informed decisions when selecting the appropriate technology models for sustainable systems development and commercialization.


Building Services Engineering- Tarik Al-Shemmeri 2021-01-26 Building Services Engineering: Smart and Sustainable Design for Health and Wellbeing covers the design practices of existing engineering building services and how these traditional methods integrate with newer, smarter developments. These new developments include areas such as smart ventilation, smart glazing systems, smart batteries, smart lighting, smart soundproofing, smart sensors and meters. Combined, these all amount to a healthier lifestyle for the people living within these indoor climates. With over one hundred fully worked examples and tutorial questions, Building Services Engineering: Smart and Sustainable Design for Health and Wellbeing encourages the reader to consider sustainable alternatives within their buildings in order to create a healthier environment for users.

BIM in Small-Scale Sustainable Design- Francois Levy 2011-11-16 “Any architect doing small or medium scaled projects who is also invested in sustainable design but is not yet doing BIM will enjoy this book’s overall focus.” – Architosh.com The book is the leading guide to architectural design within abuilding information modeling (BIM) workflow, giving the practitioner a clear procedure when designing climate-load-dominated buildings. The book incorporates new information related to BIM, integrated practice, and sustainable design, as well as information on how design engineers can incorporate the latest technological tools. Each chapter addresses specific topics, such as natural ventilation, solar heating, rainwater harvesting and building hydrology, optimizing material reuse and reducing construction waste, and collaborating with consultants or other building professional services such as engineers and energy designers.

Recent Advances in Sustainable Process Design and Optimization- Dominic C. Y. Foo 2012 This book is a compilation of the various recently developed techniques emphasizing better chemical processes and products, with state-of-the-art contributions by world-renowned leaders in process design and optimization. It covers various areas such as grass-root design, retrofitting, continuous, batch, energy, separation, and pollution prevention, striking a balance between fundamental techniques and applications. A large section of this book focuses on industrial applications and will serve as a good compilation of recent industrial experiences for which the process design and optimization techniques were practised. Industrial practitioners will fi nd this book useful in their practical work. Short-term and long-term perspectives. Short-term and long-term considerations are important elements when moving forward towards healthy practices in lifestyles, choices, and site designs. This book addresses a myriad of greening practices that can be applied to structures in our urban, suburban, and rural cultures. From the loft to the neighborhood, the office spaces to the public spaces, and the schools to the communities, this book outlines how business owners and residents can integrate scale appropriate green solutions into their lifestyles. Green Up!: Sustainable Design Solutions for Healthier Work and Living Environments includes detailed illustrations and photographs to help you understand design opportunities for your space. Stevie Famulari provides unique insights and
Sustainable Engineering - Catherine Mulligan 2019-01-30 Sustainable Engineering: Principles and Implementation provides a comprehensive overview of the interdisciplinary field of sustainability as it applies to engineering and methods for implementation of sustainable practices. Due to increasing constraints on resources and on the environment and effects of climate change, engineers are facing new challenges. While it is generally believed that the concepts of sustainable design must be adhered to so that future generations may be protected, the execution and practice of these concepts are very difficult. It is therefore the focus of this book to give both a conceptual understanding as well as practical skills to apply sustainable engineering principles to engineering design. This book introduces relevant theory, principles, and ethical expectations for engineers, presents concepts related to industrial ecology, green engineering, and eco-design, and details frameworks that indicate the challenges and constraints of applying sustainable development principles. It describes the tools, protocols, and guidelines that are currently available through case studies and examples from different engineering programs (with particular emphasis on civil, environmental and chemical engineering) and other programs in which sustainability is taught, in addition to practicing scientists and engineers and all others concerned with the sustainability of products, projects and processes. Specific Features: Discusses sources of contaminants and their impact on the environment Addresses sustainable assessment techniques, policies, protocols and guidelines Describes new tools and technologies for achieving sustainable engineering Includes social and economic sustainability dimensions Offers case studies demonstrating implementation of sustainable engineering practices

Sustainable Product Design and Development - Anoop Desai 2020-12-04 This book outlines the process of sustainable product design and development. It presents design guidelines that help prolong the life of a product and minimize its environmental impact. These guidelines specifically enable product end for-life (EoL) objectives such as reuse, recycling and remanufacturing. Sustainable Product Design and Development also presents mathematical models that will help the designer determine the cost of designing sustainable products. This cost can be computed early during the design stage of a product. Sustainable Product Design and Development presents different design hierarchies and their impact on the environment Addresses sustainable assessment techniques, policies, protocols and guidelines Describes new tools and technologies for achieving sustainable engineering Includes social and economic sustainability dimensions Offers case studies demonstrating implementation of sustainable engineering practices

Design Education for a Sustainable Future - Rob Fleming 2013-04-26 Sustainability is a powerful force that is fundamentally reshaping humanity’s relationship to the natural world and is ushering in the Age of Integration. The move from well-intentioned environmental friendliness to the higher bar of integral sustainability and regenerative design demands a new type of design professional, one that is deeply collaborative, ethically grounded, empathically connected and technologically empowered. As a response, this book argues for a great leap forward in design education: from a individualistic and competitive model customarily focused on greening; to a new approach defined by an integral consciousness, shaped by the values of inclusiveness and provided by a series of integrative behaviors including: an ethically infused design brief a co- creative design process on-going value engineering pre-emptive engineering design validation through simulation on-line enabled integrated learning the use of well vetted rating systems. This book contains the integral frameworks, whole system change methodologies and intrinsic values that will assist professors and their students in an authentic and effective pursuit of design education for a sustainable future.


Synergistic Design of Sustainable Built Environments - Chitrarekha Kalve 2020-11-09 Synergistic Design of Sustainable Built Environments introduces and illustrates a novel systems approach that fosters both design excellence and a leap toward a more biocentric (ecologically sustainable) design paradigm. The book provides a deeper understanding of the theories and principles of biocentric design and offers detailed descriptions of the synergistic design process of integrating theories and principles into practice. It also presents concepts and techniques that will enable designers to design sustainable built environments, along with qualitative and quantitative information that designers can use to generate feasible solutions in response to varying climate and occupant comfort. Features: Examines the principles and practices of the synergistic design (a fusion of anthropocentric and biocentric) of sustainable built environments and how they relate to practical applications. Presents climatic data and its analysis along with sun-path diagrams for numerous cities to aid in the design of sustainable built environments in multiple regional contexts. Includes numerous case studies of sustainable built environments in varying climatic zones. Explains how renewable energy (solar, wind, biomass, geothermal, hydro, fuel cells) can be successfully integrated into the built environment. This forward-thinking and highly illustrated book will be an invaluable reference to all those concerned with sustainable built environments and related architectural issues.

Green BIM - Eddy Kryjevic 2008-04-28 Meet the challenge of integrating Building Information Modeling and sustainability with this in-depth guide, which pairs these two revolutionary movements to create environmentally friendly design through a streamlined process. Written by an award-winning team that has gone beyond theory to lead the implementation of Green BIM projects, this comprehensive reference features practical strategies, techniques, and real-world expertise so that you can create sustainable BIM projects, no matter what their scale.

Sustainable Environmental Engineering - Walter Z. Tang 2018-08-01 The important resource that explores the twelve design principles of sustainable environmental engineering Sustainable Environmental Engineering (SEE) is to research, design, and build Environmental Engineering Infrastructure System (EEIS) in harmony with nature using life cycle cost analysis and benefit analysis and life cycle assessment and to protect human health and environments at minimal cost. The foundations of the SEE are the twelve design principles (TPDs) with three specific rules for each principle. The TPDs attempt to transform how environmental engineering could be taught by prioritizing six design hierarchies through six different dimensions. Six design hierarchies are: prevention, recovery, remediation, and optimization. Six dimensions are integrated system, material economy, reliability on spatial scale, resiliency on temporal scale, and cost effectiveness. In addition, the authors, two experts in the field, introduce major computer packages that are useful to solve real environmental engineering design problems. The text presents how specific environmental engineering design problems could be identified and prioritized under climate change through quantification of air, water, and soil quality indexes. For water pollution control, eight innovative technologies which are critical in the paradigm shift from the conventional environmental engineering design to water resource recovery facility (WRRF) are examined in detail. These new processes include UV disinfection, membrane separation technologies, Anaerobic membrane biological reactor, struvite precipitation, Fenton process, photocatalytic oxidation of organic pollutants, as well as green infrastructure. Computer tools are provided to facilitate life cycle cost and benefit analysis of WRRF. This important resource: Includes statistical analysis of engineering design parameters using

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Statistical Package for the Social Sciences (SPSS) • Presents Monte Carlo simulation using Crystal ball to quantify uncertainty and sensitivity of design parameters. Aspects of new energy, materials, processes, products, and system to achieve energy positive WRRF that are illustrated with Matlab • Provides information on life cycle costs in terms of capital and operation for different processes using Matlab Witten for senior or graduates in environmental or chemical engineering. Sustainable Environmental Engineering defines and illustrates the TDPs of SEE. Undergraduates, students, and engineers who need to optimize codes are useful in their EEIS design. The exercise at the end of each chapter encourages students to identify EEI engineering problems in their own city and find creative solutions by applying the TDPs. For more information, please visit www.tamf.fi.edu.

Reactor and Process Design in Sustainable Energy Technology. Fan Shi 2014-07-28 Reactor Process Design in Sustainable Energy Technology compiles and explains current developments in reactor and process design in sustainable energy technologies, including optimization and scale-up methodologies and numerical methods. Sustainable energy technologies that require more efficient means of converting and utilizing energy can help provide for burgeoning global energy demand while reducing anthropogenic carbon dioxide emissions associated with energy production. The book, contributed by an international team of academic and industry experts in the field, brings numerous reactor design cases to readers based on their valuable experience from lab R&D scale to industry levels. It is the first to emphasize reactor engineering in sustainable energy technology discussing design. It provides comprehensive tools and information to help engineers and energy professionals learn, design, and specify chemical reactors and processes confidently. Emphasis on reactor engineering in sustainable energy technology Up-to-date overview of the latest research engineering techniques in reactor topics Expert accurate knowledge on reactor types, processing, and optimization Figures and tables designed to comprehensively present concepts and procedures Hundreds of citations drawing on many recent and previously published works on the subject

Sustainable Design and Manufacturing—Steffen G. Scholz 2021-10-19 This book consists of peer-reviewed papers, presented at the International Conference on Sustainable Design and Manufacturing (SDM 2021). Leading-edge research into sustainable design and manufacturing aims to enable the manufacturing industry to grow by adopting more advanced technologies and at the same time improve its sustainability by reducing its environmental impact. Relevant themes and topics include sustainable design, innovation and services; sustainable manufacturing processes and technology; sustainable manufacturing systems and enterprises; and decision support for sustainability. Application areas are wide and varied. The book will provide an excellent overview of the latest developments in the sustainable design and manufacturing area.

Sustainable Composites for Lightweight Applications—Horn D. Dhakal 2020-11-22 Carbon and glass fibre reinforced composite materials have been used for many years in several different types of applications. However, these conventional composites are derived from non-renewable reinforcements and they pose a significant threat to the environment. Government legislation and consumer behaviour have recently forced many industries to adapt sustainable composites. Industries such as automotive, marine and aerospace are now seeking sustainable lightweight composites with the aim to reduce the overall weight of the components with enhanced materials and design aspects. Therefore, there is high demand on research for the development of sustainable lightweight composites. This book presents a comprehensive review of lightweight composites with the central aim to increase their use in key industrial sectors such as automotive, marine and aerospace. There is now such a great current availability that is dedicated to sustainable lightweight applications covering important topics such as key drivers for lightweight composites, mechanical properties, damage characterisation, durability and environmental aspects. Key topics that are addressed include: The roles of reinforcements and matrices in composite material; environmental issues and their morphological structures Lightweight applications and properties requirements Design, manufacturing processes and their effects on properties Testing and damage characterisation of composite materials Sustainable composites and techniques for property enhancement Future trends and challenges for sustainable composites in lightweight applications It will be a valuable resource for those working in various fields such as Science, polymer science, materials engineering, and industries involved in the manufacture of automotive and aerospace components from lightweight composite materials. Provides a comprehensive review of sustainable lightweight composites looking at key industrial applications such as automotive, marine, and aerospace and construction Important relationships between structure and properties are analysed in detail. Enhancements of properties through hybrid systems, are also explored with emphasis on design, materials selection and manufacturing techniques.

Systems Analysis for Sustainable Engineering: Theory and Applications—Ni-Bin Chang 2010-10-22 IMPLEMENT SYSTEMS ANALYSIS TOOLS IN SUSTAINABLE ENGINEERING Featuring a multidisciplinary approach, Systems Analysis for Sustainable Engineering: Theory and Applications provides a proven framework for applying systems analysis tools to account for environmental impacts, energy efficiency, cost-effectiveness, socioeconomic implications, and ecosystem health in engineering solutions. This pioneering work addresses the increased levels of sophistication embedded in many complex large-scale infrastructure systems and their interactions with the natural environment. After a detailed overview of sustainable systems engineering, the book covers mathematical theories of systems analysis, environmental resources management, industrial ecology, and sustainable design. Real-world examples highlight the methodologies presented in this authoritative resource. COVERAGE INCLUDES: Structured systems analysis for sustainable design Systems analysis and sustainable management strategies Economic valuation, instruments, and project selection Statistical forecasting models Linear, nonlinear, integer, and dynamic programming models Multicriteria decision analyses System dynamics models and simulation analyses Water resources and quality management Air quality management Solid waste management Soil and groundwater remediation Planning Industrial ecology and sustainability Green building and green infrastructure systems Energy resources management and energy systems engineering Land resources management and agricultural sustainability

Sustainable Design and Construction for Geomaterials and Geosstructures—Behzad Fatahi 2018-07-12 This book presents recent research findings and critically reviews the existing literature related to assessment of geotechnical structures under complex and extreme loading conditions such as cyclic, seismic and blast loads. Special emphasis is given to experimental analysis in many complex large-scale infrastructure tunneling while advanced numerical modelling techniques are utilized for modelling and accurate predictions in emerging construction projects such as tunneling and embankments. The book is in line with current trends in civil engineering which are moving towards sustainable design and construction addressing the energy and material challenges. Papers were selected from the 5th International Conference on Sustainable Civil Infrastructures Confronting Severe Weathers and Climate Changes: From Failure to Sustainability, held on July 23 to 25, 2018 in HangZhou, China.

Sustainable Food Processing and Engineering Challenges—Charis Michiel Galanakis 2021-03-16 Sustainability is becoming a major item for the food industry around the world, as resources become more restricted and demand grows. Food processing ensures that the resources required producing raw food materials and ingredients for food manufacturing are used most efficiently. Responding to the goals of sustainability requires the maximum utilization of all raw materials produced and integration of activities throughout all food processing stages. To maximize the conversion of raw materials into consumer products, food engineering and food processing challenges should be met. Sustainable Food Processing and Engineering Challenges covers the most trend topics and challenges of sustainable food processing and food engineering, giving emphasis in engineering packaging for a sustainable food chain, food processing technologies, Industry 4.0 applied to food, food digestion engineering, sustainable alternative food processing technologies, physico-chemical aspects of food, cold plasma technology, refrigeration climate control, nonthermal pasteurisation and sterilization, nanotechnology and alternative processes requiring less resources, sustainable innovation in food product design etc. Edited by a multiple team of experts, the book is aimed at food engineers who are seeking to improve efficiency of production systems and also researchers, specialists, chemical engineers and professionals working in food processing. Covers the most trend topics and challenges of sustainable food processing and food engineering brings developments in methods to reduce the carbon footprint of the food system. Explores emerging topics such as Industry 4.0 applied to food and Food digestion engineering

Risk, Reliability and Sustainable Remediation in the Field of Civil and Environmental Engineering—Theodora Vamshi 2022-02-01 Risk, Reliability and Sustainable Remediation in the Field of Civil and Environmental Engineering illustrates the concepts of risk, reliability analysis, its estimation, and the decisions leading to sustainable development in the field of civil and environmental engineering. The book provides key ideas on risks in performance failure and structural failures of...
all processes involved in civil and environmental systems, evaluates reliability, and discusses the implications of measurable indicators of sustainability in important aspects of multitude of civil engineering projects. It will help practitioners become familiar with tolerances in design parameters, uncertainties in the environment, and applications in civil and environmental systems. Furthermore, the book emphasizes the importance of risks involved in design and planning stages and covers reliability techniques to discover and remove the potential failures to achieve a sustainable development. Contains relevant theory and practice related to risk, reliability and sustainability in the field of civil and environment engineering.

Gives firsthand experience of new tools to integrate existing artificial intelligence models with large information obtained from different sources.

Provides engineering solutions that have a positive impact on sustainability.