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Introduction To Sustainable Engineering By R L Rag

This volume is the most comprehensive textbook on sustainable development. It has been developed with students and professionals from around the world specifically for those who need a thorough grounding in the subject. Coverage includes: background to sustainable development and global environmental issues; measurement and sustainability indicators; environmental assessment, management and policy; approaches and linkages to poverty reduction; impacts and infrastructure development; economics, consumption, production and

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market failures; governance; participation; disaster management; international financial institutions; international environmental agreements; and the role of civil society.

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

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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 materials on various 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

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rigorous targets that benchmark the performance of industrial processes then 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

Designed for use in engineering design courses, and as a reference for industry professionals learning sustainable design concepts and practical methods, Sustainability in

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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

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design tools to guide engineering 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' own research and experiences

Environmental Engineering: Fundamentals, Sustainability, Design presents civil engineers with an introduction to chemistry and biology, through a mass and energy balance approach. ABET required topics of emerging importance, such as sustainable and global engineering are also covered. Problems, similar to those on the FE and PE exams, are integrated at the end of each chapter. Aligned

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with the National Academy of Engineering's focus on managing carbon and nitrogen, the 2nd edition now includes a section on advanced technologies to more effectively reclaim nitrogen and phosphorous. Additionally, readers have immediate access to web modules, which address a specific topic, such as water and wastewater treatment. These modules include media rich content such as animations, audio, video and interactive problem solving, as well as links to explorations. Civil engineers will gain a global perspective, developing into innovative leaders in sustainable development.

An Introduction to Sustainable Development
Sustainable Energy
Switchable Solvents

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Environmental Engineering

The Guide to Green Engineering and Design

Sustainable Product Development

This third edition of a successful, established text provides a concise and well-illustrated introduction to the ideas behind, and the practices flowing from the notion of sustainable development.

This book explores the challenges our society faces in making the transition to renewable resource use in a way that is truly sustainable – environmentally, economically and socially. After exploring the physical limits the laws of thermodynamics impose on resource exploitation, the book outlines options for managing resources within these limits.

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It then moves on to look at the resources themselves (from fossil fuels, through minerals to renewable resources such as timber) and the salient question of how the relentless increase in consumption is putting untenable strain on resource use. Case studies investigate what is being done across a range of sectors – and what is and isn't working. The second half of the book turns to solutions, from the promise of industrial ecology to a new economy based on renewable resources such as biobased materials from agricultural crops and forests. Suitable for under- and postgraduate courses on environmental limits and resource use, and continuing professional development – particularly resource management, materials, industrial

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ecology, energy, resource economics and engineering. This textbook provides an accessible introduction to various energy transformation technologies and their influences on the environment. Here the energy transformation is understood as any physical process induced by humans, in which energy is intentionally transformed from one form to another. This book provides an accessible introduction to the subject: covering the theory, principles of design, operation, and efficiency of the systems in addition to discerning concepts such as energy entropy, exergy, efficiency, and sustainability. It is not assumed that readers have any previous exposure to such concepts as laws of thermodynamics, entropy, exergy, fluid

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mechanics or heat transfer, and is therefore an ideal textbook for advanced undergraduate students. Key features: Represents a complete source of information on sustainable energy transformation systems and their externalities. Includes all existing and major emerging technologies in the field. Chapters include numerous examples and problems for further learning opportunities. This book, *Engineering and Sustainable Community Development*, presents an overview of engineering as it relates to humanitarian engineering, service learning engineering, or engineering for community development, often called sustainable community development (SCD). The topics covered include a history of engineers and

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development, the problems of using industry-based practices when designing for communities, how engineers can prepare to work with communities, and listening in community development. It also includes two case studies -- one of engineers developing a windmill for a community in India, and a second of an engineer "mapping communities" in Honduras to empower people to use water effectively -- and student perspectives and experiences on one curricular model dealing with community development. Table of Contents: Introduction / Engineers and Development: From Empires to Sustainable Development / Why Design for Industry Will Not Work as Design for Community / Engineering with Community /

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Listening to Community / ESCD Case Study 1: Sika Dhari's Windmill / ESCD Case Study 2: Building Organizations and Mapping Communities in Honduras / Students' Perspectives on ESCD: A Course Model / Beyond Engineers and Community: A Path Forward Systems Analysis for Sustainable Engineering: Theory and Applications
Sustainable Infrastructure
Sustainable Design Through Process Integration
The Theory and Practice of Sustainable Engineering
Fundamentals and Applications to Industrial Pollution Prevention, Resource Conservation, and Profitability Enhancement

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Tools, Methods and Examples

A multidisciplinary introduction to sustainable engineering exploring challenges and solutions through practical examples and exercises.

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

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initiatives, and sustainable master-planning. This complete guide provides guidance on the role creative thinking and collaborative team-building play in meeting solutions needed to affect a sustainable transformation of the built environment.

Evaluates trade-offs and uncertainties inherent in achieving sustainable energy, analyzes the major energy technologies, and provides a framework for assessing policy options.

This book offers a comprehensive review of sustainability and product design, providing useful information on the relevant regulations

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and standards for industries to meet increasing market demands for eco-products, while reducing their impact on the environment. The examples and methods presented allow readers to gain insights into sustainable products. The authors also explain how to develop products with sustainability features by applying tools and methods for sustainable design and manufacture. These tools/methods include • Regulations/directives related to sustainable product development • Popular lifecycle analysis software packages • Environmental and social lifecycle impact assessment methods • Lifecycle

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inventory databases • Eco-point and eco-accounting infrastructure • ICT and traceability technologies for sustainable product development • Sustainable design and manufacture • Integrated approach for sustainable product development A description of each sustainability tool is accompanied by easy-to-understand guidelines as well as sustainable product development methods. Five different case studies are also presented to illustrate how to apply the tools and methods into the development of real sustainable products. In view of the increasing pressure on

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industries to meet the, sometimes conflicting, demands of the market and environment, this book is a valuable resource for engineers and managers in manufacturing companies wishing to update their knowledge of sustainable product development. It is also suitable for researchers and consultants who are involved or interested in sustainable product development, as well as for students studying sustainable development, production, and engineering management.

Assessment, Prioritization, Improvement, Design and Optimization

A Practical Guide for Sustainable Design

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Engineering for Sustainable Communities Principles and Practices

The Science of Sustainability and Green Engineering

Sustainable Engineering

KEY BENEFIT: The first book of its kind devoted completely to industrial ecology/green engineering, this introduction uses industrial ecology principles and cases to ground the discussion of sustainable engineering—and offers practical and reasonable approaches to design decisions. KEY TOPICS: Technology and Sustainability; Industrial Ecology(IE) and Sustainable Engineering (SE) Concepts;

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Relevance of Biological Ecology to Technology; Metabolic Analysis; Technological Change and Evolving Risk; Social Dimensions of Industrial Ecology; Concept of Sustainability; SE; Industrial Product Development; Design for Environment and for Sustainability; Introduction to Life-Cycle Assessment; LCA Impact and Interpretation Stages; Streamlining the LCA Process; Systems Analysis; Industrial Ecosystems; Material Flow Analysis; National Material Accounts; Energy and IE; Water and IE; Urban IE; Modeling in IE; Scenarios for IE; Status of Resources; IE and SE in Developing Countries; IE and Sustainability in the Corporation/Government/Society MARKET: A useful reference for professionals in

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environmental science, environmental policy, and engineering.

Green Sustainable Process for Chemical and Environmental Engineering and Science: Switchable Solvents explores the preparation, properties, chemical processes and applications of this class of green solvents. The book provides an in-depth overview on the area of switchable solvents in various industrial applications, focusing on the purification and extraction of chemical compounds utilizing green chemistry protocols that include liquid-liquid, solid-liquid, liquid-gas and lipids separation technologies. In addition, it includes recent advances in greener extraction and separation processes. This book will be

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an invaluable guide to students, professors, scientists and R&D industrial specialists working in the field of sustainable chemistry, organic, analytical, chemical engineering, environmental and pharmaceutical sciences. Provides a broad overview of switchable solvents in sustainable chemical processes Compares the use of switchable solvents as greener solvents over conventional solvents Outlines eco-friendly organic synthesis and chemical processes using switchable solvents Lists various industrial separations/extraction processes using switchable solvents

Transition Engineering: Building a Sustainable Future examines new strategies emerging in response to the

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mega-issues of global climate change, decline in world oil supply, scarcity of key industrial minerals, and local environmental constraints. These issues pose challenges for organizations, businesses, and communities, and engineers will need to begin developing ideas and projects to implement the transition of engineered systems. This work presents a methodology for shifting away from unsustainable activities. Teaching the Transition Engineering approach and methodology is the focus of the text, and the concept is presented in a way that engineers can begin applying it in their work.

This text presents a balanced treatment of environmental engineering by combining engineering

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concepts with the importance of environmental ethics. This third edition highlights sustainable development and emphasizes the need for engineers to become even more environmentally responsible during this time of increasing awareness of environmental concerns. The authors challenge students with problems that require not only a technical solution but a thorough consideration of its ethical ramifications. The text also provides comprehensive exposure to all types of environmental problems, including ecosystem dynamics, wastewater treatment, and air pollution control. Important Notice: Media content referenced within the product description or the product text may

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not be available in the ebook version.

Choosing Among Options

Sustainable Design

INTRODUCTION TO SUSTAINABLE ENGINEERING

Fueling Our Future: An Introduction to Sustainable Energy

Sustainable Environmental Engineering

Engineering and Sustainable Community

Development

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

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assessment and to protect human health and environments at minimal cost. The foundations of the SEE are the twelve design principles (TDPs) with three specific rules for each principle. The TDPs attempt to transform how environmental engineering could be taught by prioritizing six design hierarchies through six different dimensions. Six design hierarchies are prevention, recovery, separation, treatment, 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 issues could be identified and prioritized under climate change through quantification of air, water, and soil quality indexes. For

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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, Anammox, 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 Statistical Package for the Social Sciences (SPSS)
- Presents Monte Carlo simulation using Crystal ball to quantify uncertainty and sensitivity of design parameters
- Contains design methods of new energy, materials, processes, products, and system to achieve energy positive WRRF

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that are illustrated with Matlab • Provides information on life cycle costs in terms of capital and operation for different processes using MatLab Written for senior or graduates in environmental or chemical engineering, Sustainable Environmental Engineering defines and illustrates the TDPs of SEE. Undergraduate, graduate, and engineers should find the computer 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.tang.fiu.edu.

With "Sustainability: A Comprehensive Foundation," first and second-year college students are introduced to this expanding new field, comprehensively exploring the essential concepts from every branch of knowledge - including engineering and the applied arts,

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natural and social sciences, and the humanities. As sustainability is a multi-disciplinary area of study, the text is the product of multiple authors drawn from the diverse faculty of the University of Illinois: each chapter is written by a recognized expert in the field.

Provides an overview of the current supply and demand for power resources and how the country's dependence on fossil fuels can be modified towards more sustainable resources for the future.

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 "hows" 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

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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 For architects, designers, and engineers, this book enables them to not only implement green design methods, but also to choose these methods based on science. With its many examples,

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case studies, and exercises, the book is also an ideal textbook for students in civil and environmental engineering, construction, and architectural engineering.

Industrial Ecology and Sustainable Engineering

Sustainability in Engineering Design

Green Sustainable Process for Chemical and Environmental Engineering and Science

Sustainable Environment and Infrastructure

Engineering for Sustainability

Fundamentals and Applications

Sustainable Engineering: Principles and Implementation provides a comprehensive overview of the interdisciplinary field

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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 being faced with 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

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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

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of applying sustainable development principles. It describes the tools, protocols, and guidelines that are currently available through case studies and examples from around the world. The book is designed to be used by undergraduate and graduate students in any engineering program (with particular emphasis on civil, environmental and chemical engineering) and other programs in which sustainability is taught, in addition

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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

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Offers case studies demonstrating implementation of sustainable engineering practices

Engineering for Sustainable Communities: Principles and Practices defines and outlines sustainable engineering methods for real-world engineering projects.

Methods in Sustainability Science: Assessment, Prioritization, Improvement, Design and Optimization presents cutting edge, detailed

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methodologies needed to create sustainable growth in any field or industry, including life cycle assessments, building design, and energy systems. The book utilized a systematic structured approach to each of the methodologies described in an interdisciplinary way to ensure the methodologies are applicable in the real world, including case studies to demonstrate the methods. The chapters are written by a global team of authors

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in a variety of sustainability related fields. *Methods in Sustainability Science: Assessment, Prioritization, Improvement, Design and Optimization* will provide academics, researchers and practitioners in sustainability, especially environmental science and environmental engineering, with the most recent methodologies needed to maintain a sustainable future. It is also a necessary read for postgraduates in sustainability, as well as academics

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and researchers in energy and chemical engineering who need to ensure their industrial methodologies are sustainable. Provides a comprehensive overview of the most recent methodologies in sustainability assessment, prioritization, improvement, design and optimization Sections are organized in a systematic and logical way to clearly present the most recent methodologies for sustainability and the chapters utilize

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an interdisciplinary approach that covers all considerations of sustainability Includes detailed case studies demonstrating the efficacies of the described methods

Sustainable Engineering Practice: An Introduction provides a broad, fundamental understanding of sustainability principles and their application to engineering work. It is intended to fill a need for a primer on sustainability that can be introduced

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early in an engineer's career: it brings together all the basic dimensions of the history, concepts, and applications of sustainable engineering; and through a variety of examples and references, inspires and encourages engineers to pursue and integrate sustainable engineering into their work on a life-long basis. The report contains: background summary of the role and accomplishments of engineers in sustainable development.

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The complete report, Engineers and Sustainable Development, is contained on the accompanying CD ROM; summary of the major commitments made and implementation activities agreed upon at the World Summit on Sustainable Development, held in Johannesburg, South Africa, in September 2002, and the initial steps taken by the U.S. engineering community and its global partners; wide spectrum of examples, which describe how sustainability

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principles can and are being integrated and applied in engineering education, research will benefit from this primer on sustainable development and its concepts and applications.

Sustainability

Drivers, Metrics, Tools, and Applications

Risk, Reliability and Sustainable Remediation in the Field of Civil and Environmental Engineering
Building a Sustainable Future

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A Comprehensive Foundation

Sustainable Process Engineering

Preface -- 1. Introduction -- 2. Setting up a design assignment -- 3. Structuring the sustainability context -- 4. Creating design solutions -- 5. Acquiring sustainable design competences.

This volume contains selects papers presented during the 2nd International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering, held in the University of Illinois at Chicago. It covers the recent innovations, trends, and concerns, practical challenges encountered, and the solutions adopted in

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waste management and engineering, geotechnical and geoenvironmental engineering, infrastructure engineering, and sustainable engineering. This book will be useful for academics, educators, policy makers and professionals working in the field of civil engineering, chemical engineering, environmental sciences and public policy.

Introduction to Sustainability for Engineers aims to incorporate sustainability into curricula for undergraduate engineering students. The book starts with an introduction to the concept of sustainability, outlining core principles for sustainable development to guide engineering practice and decision making, including key tools aimed at enabling, measuring and

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communicating sustainability. It also describes concepts as life cycle assessment, environmental economics, related institutional architecture and policy framework, business context of sustainability, and sustainable buildings and infrastructure. Appendices at the end of the book presents a summary of key concepts, strategies and tools introduced in the main text. Five Key Benefits: A comprehensive textbook for engineering students to develop competency in sustainability. Presents a framework for engineers to put sustainability into practice. Presents the link between sustainability and the design process. It shows the application of a sustainable engineering design process for putting

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sustainability into practice. There are well woven case studies and links to websites for learning in various engineering disciplines. Includes challenging exercises at the end of each chapter that will inspire students and stimulate discussion in the class.

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

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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

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existing artificial intelligence models with large information obtained from different sources Provides engineering solutions that have a positive impact on sustainability

*Concepts, Design and Case Studies
An Introduction*

Sustainability, Introduction to Sustainable Engineering

Transition Engineering

Methods in Sustainability Science

IMPLEMENT SYSTEMS ANALYSIS TOOLS IN SUSTAINABLE ENGINEERING Featuring a

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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

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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

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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

Green Sustainable Process for Chemical and Environmental Engineering and Science:

Biosurfactants for the Bioremediation of Polluted Environments explores the use of biosurfactants in remediation initiatives, reviewing knowledge surrounding the creation and application of

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biosurfactants for addressing issues related to the release of toxic substances in ecosystems. Sections cover their production, assessment and optimization for bioremediation, varied pollutant degradation applications, and a range of contaminants and ecological sites. As awareness and efforts to develop greener products and processes continues to grow, biosurfactants are garnering more attention for the potential roles they can play in reducing the use and production of more toxic products. Drawing on the knowledge of its expert team of global contributors, this book provides useful insights for all those

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currently or potentially interested in developing or applying biosurfactants in their own work. Provides an accessible introduction to biosurfactant chemistry Highlights the optimization, modeling, prediction and kinetics of key factors supporting biosurfactant-enhanced biodegradation processes Explores a wide range of biosurfactant applications for remediation and degradation of pollutants

Sustainable process engineering is a methodology to design new and redesign existing processes that follow the principles of green chemistry and green engineering, and ultimately contribute to a sustainable

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development. The newest achievements of chemical engineering, opened new opportunities to design more efficient, safe, compact and environmentally benign chemical processes. The book provides a guide to sustainable process design applicable in various industrial fields. • Discusses the topic from a wide angle: chemistry, materials, processes, and equipment. • Includes state-of-the-art research achievements that are yet to be industrially implemented. • Transfers knowledge between chemists and chemical engineers. • QR codes direct the readers to animations, short videos, magazines,

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and blogs on specific topics • Worked examples deepen the understanding of the sustainable assessment of chemical manufacturing processes

Introduction to Sustainability for Engineers CRC Press

Introduction to Sustainability for Engineers Fundamentals, Sustainability, Design

Proceedings of EGRWSE 2019

Introduction to Sustainable Energy Transformation

Sustainable Engineering Practice

An Introduction to Sustainable Resource Use

Successfully Measure the Benefits of Green Design and Construction Sustainability in Engineering Design and Construction

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outlines the sustainable practices used in engineering design and construction operations for all types of engineering and construction projects. Aimed at ushering the engineering and construction industry into embracing sustainable practices and green construction techniques, this book addresses sustainability in engineering design and construction operations from a historical and global perspective, and delves into specific sustainability concepts and processes. The book explains the concepts of sustainable development, corporate social responsibility (CSR), the Dow Jones Global Sustainability Index (DJGSI), key performance indicators (KPIs), corporate sustainability, and the triple bottom line (economic, environmental, and social values in design and construction). Relevant to sustainability in every facet of engineering and construction, it also covers life-cycle

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environmental cost analysis, discusses sustainable engineering and site selection, the economic considerations evaluated when making sustainability decisions, and explains how to measure and quantify sustainable performance and apply these practices in the real world. It also covers project and corporate level sustainability practices, sustainable construction materials and processes, sustainable heavy construction equipment, traditional and alternative energy sources, provides implementation resources for starting and evaluating sustainability programs, and includes a checklist for measuring the sustainability of construction operations. The text contains detailed information on sustainable construction materials and processes, heavy construction equipment, and traditional and alternative energy sources. It presents information on sustainable designs, selecting sustainable sites, designing for passive survivability,

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designing for disassembly, and the ISO 14,000 standards. It provides implementation resources for starting and evaluating sustainability programs and a checklist for measuring the sustainability of construction operations In addition, it provides definitions of sustainability terms and expressions, as well as case studies, examples, discussion questions, and a list of supplemental references at the end of each chapter. This book provides information on:

- Definitions for sustainability terms
- Sources for locating global sustainability requirements
- Current sustainability issues
- Environmental laws related to sustainability and their implications
- Sustainable design
- Life-cycle cost assessment models
- Sustainable practices currently being used in the engineering and construction (E&C) industry
- Corporate-level sustainability practices
- Project-level sustainability practices
- Global sustainability trends

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and implications Sustainable materials Sustainable heavy construction equipment Traditional and alternative energy sources LEED Green Building Rating System Sustainability organizations and certification programs Sustainability implementation resources A summary of sustainable engineering design and construction 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

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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 integrates essential engineering and quantitative design skills, industry perspectives, and case studies, enabling engineering professionals, educators, and students to incorporate sustainability throughout their work. Coverage includes

- A concise review of the natural resource and environmental challenges engineers face when designing for sustainability
- Analysis and legislative frameworks for addressing environmental issues and sustainability
- Methods for identifying green and sustainable materials
- Principles for improving

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the sustainability of engineering designs Tools for evaluating sustainable designs and monetizing their benefits

The Theory and Practice of Sustainable Engineering is appropriate to use in sustainable engineering classes for both majors and non-majors. This textbook was designed as the basis for a course in itself, but it can be used to provide modules in existing courses, or as a supplementary text in sustainable engineering, green engineering, industrial ecology, sustainability law and policy, and environmental courses. Although this is a book about sustainable engineers, it is meant for a broader audience. This is not just an engineering text for engineering students, but also an engineering text for non-engineers who want to better understand the world, and be able to rationally, ethically, and responsibly respond to its challenges and emergent behaviors. Sustainable engineering is

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learning how to engineer responsibly and professionally in the Anthropocene: the Age of the Human. This book sketches out the cultural, social, institutional, and environmental context within which engineering and, more broadly, technology systems are now situated. It provides frameworks to facilitate understanding, communication, and the solving of highly complex problems with significant technological dimensions — all in the name of generating more capable professionals competent in their chosen field, who are able to integrate other disciplines to address complex adaptive systems.

Comprehensively covers the definition, methodology, and current applications of the principles of sustainability and resiliency in every engineering discipline This book contains detailed information about sustainability and resiliency principles and

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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. Sustainable Engineering: 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

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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 sites, civil construction and infrastructure, and climate geoengineering Presents a set of case

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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 questions at the end of each chapter as well as a solutions manual for academic adopters The depth of coverage found in Sustainable Engineering: Drivers, Metrics, Tools, and Applications makes it an ideal textbook for graduate students across all engineering disciplines and a handy resource for active professionals.

Biosurfactants for the Bioremediation of Polluted Environments

Principles and Implementation

Introduction to Environmental Engineering

Sustainability in Engineering Design and Construction

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Principles and Practice

Introduction to Sustainable Engineering

Sustainability has become a sine qua non in the study and practice of engineering. This introductory textbook aims to make the concepts of sustainable engineering accessible to the undergraduate students of engineering. This will help them to keep in view the philosophy of sustainability while learning the core subjects of their specialisations and will equip them with a set of tools for this purpose. In addition to providing a broad-based introduction to the idea of sustainability and its relevance, the book talks about environment-related legislation, air and water pollution, solid waste management, local and global environmental challenges, climate change and the steps taken at an

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international level to manage them. Tools used to ensure sustainability in engineering activities such as Environmental Management Systems (EMS) and Environmental Impact Assessment (EIA) are mentioned. Green buildings, green computing, green chemistry, sustainable cities, sustainable transportation, sustainable sources of energy, economic and social factors affecting sustainability including rapid urbanization and poverty are also covered. A set of questions, some of them quite open-ended, are added at the end of each chapter to help students test their understanding. The reader is encouraged to use this book as a starting point to explore how the principles of sustainable engineering are relevant to their chosen branch of study and professional practice. The references given at the end of the

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book will serve as efficient guideposts in this journey which is well worth taking.

A comprehensive resource to sustainability and its application to the environmental, industrial, agricultural and food security sectors Sustainability fills a gap in the literature in order to provide an important guide to the fundamental knowledge and practical applications of sustainability in a wide variety of areas. The authors – noted experts who represent a number of sustainability fields – bring together in one comprehensive volume the broad range of topics including basic concepts, impact assessment, environmental and the socio-economic aspects of sustainability. In addition, the book covers applications of sustainability in environmental, industrial, agricultural and

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food security, as well as carbon cycle and infrastructural aspects. Sustainability addresses the challenges the global community is facing due to population growth, depletion of non-renewable resources of energy, environmental degradation, poverty, excessive generation of wastes and more. Throughout the book the authors discuss the economics, ecological, social, technological and systems perspectives of sustainability. This important resource:

- Explores the fundamentals as well as the key concepts of sustainability;
- Covers basic concepts, impact assessment, environmental and socio-economic aspects, applications of sustainability in environmental, industrial, agricultural and food security, carbon cycle and infrastructural aspects;
- Argues the essentiality of sustainability in ensuring the

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propitious future of earth systems; and • Authored by experts from a range of various fields related to sustainability. Written for researchers and scientists, students and academics, Sustainability: Fundamentals and Applications is a comprehensive book that covers the basic knowledge of the topic combined with practical applications.