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## **KEY=EXPLORATIONS - KAYDEN AVERY**

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## **TEST GENERATOR ASSESSMENT ITEM LISTING**

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## **HOLT BIOLOGY: PRINCIPLES AND EXPLORATIONS**

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## **ART AND CULTURAL HERITAGE**

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## **LAW, POLICY AND PRACTICE**

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*Cambridge University Press This volume contains relevant and pressing issues in the law, policy, and the practice of art and cultural heritage protection.*

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## **HOW LEARNING WORKS**

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## **SEVEN RESEARCH-BASED PRINCIPLES FOR SMART TEACHING**

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*John Wiley & Sons Praise for How Learning Works "How Learning Works is the perfect title for this excellent book. Drawing upon new research in psychology, education, and cognitive science, the authors have demystified a complex topic into clear explanations of seven powerful learning principles. Full of great ideas and practical suggestions, all based on solid research evidence, this book is essential reading for instructors at all levels who wish to improve their students' learning." —Barbara Gross Davis, assistant vice chancellor for educational development, University of California, Berkeley, and author, Tools for Teaching "This book is a must-read for every instructor, new or experienced. Although I have been teaching for almost thirty years, as I read this book I found myself resonating with many of its ideas, and I discovered new ways of thinking about teaching." —Eugenia T. Paulus, professor of chemistry, North Hennepin Community College, and 2008 U.S. Community Colleges*

*Professor of the Year from The Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education "Thank you Carnegie Mellon for making accessible what has previously been inaccessible to those of us who are not learning scientists. Your focus on the essence of learning combined with concrete examples of the daily challenges of teaching and clear tactical strategies for faculty to consider is a welcome work. I will recommend this book to all my colleagues." —Catherine M. Casserly, senior partner, The Carnegie Foundation for the Advancement of Teaching "As you read about each of the seven basic learning principles in this book, you will find advice that is grounded in learning theory, based on research evidence, relevant to college teaching, and easy to understand. The authors have extensive knowledge and experience in applying the science of learning to college teaching, and they graciously share it with you in this organized and readable book." —From the Foreword by Richard E. Mayer, professor of psychology, University of California, Santa Barbara; coauthor, e-Learning and the Science of Instruction; and author, Multimedia Learning*

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## **PHYSICAL BIOLOGY OF THE CELL**

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*Garland Pub "Physical Biology of the Cell maps the huge and complex landscape of cell and molecular biology from the distinct perspective of physical biology. As a key organizing principle, the proximity of topics is based on the physical concepts that unite a given set of biological phenomena. Herein lies the central premise: that the appropriate application of a few fundamental physical models can serve as the foundation of whole bodies of quantitative biological intuition, useful across a wide range of biological problems. The Second Edition features full-color illustrations throughout, two new chapters on the role of light in life and pattern formation, additional explorations of biological problems using computation, and significantly more end-of-chapter problems. This textbook is written for a first course in physical biology or biophysics for undergraduate or graduate students"--*

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## **BULLETIN OF THE ATOMIC SCIENTISTS**

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## **MOLECULAR BIOLOGY OF THE CELL**

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## **STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES**

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## **A PATH FORWARD**

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*National Academies Press Scores of talented and dedicated people serve the forensic science community, performing vitally important work. However, they are often constrained by lack of adequate resources, sound policies, and national support. It is clear that change and advancements, both systematic and scientific, are needed in a number of forensic science disciplines to ensure the reliability of work, establish enforceable standards, and promote best practices with consistent application. Strengthening Forensic Science in the United States: A Path Forward provides a detailed plan for addressing these needs and suggests the creation of a new government entity, the National Institute of Forensic Science, to establish and enforce standards within the forensic science community. The benefits of improving*

and regulating the forensic science disciplines are clear: assisting law enforcement officials, enhancing homeland security, and reducing the risk of wrongful conviction and exoneration. *Strengthening Forensic Science in the United States* gives a full account of what is needed to advance the forensic science disciplines, including upgrading of systems and organizational structures, better training, widespread adoption of uniform and enforceable best practices, and mandatory certification and accreditation programs. While this book provides an essential call-to-action for congress and policy makers, it also serves as a vital tool for law enforcement agencies, criminal prosecutors and attorneys, and forensic science educators.

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## **BULLETIN OF THE ATOMIC SCIENTISTS**

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*The Bulletin of the Atomic Scientists is the premier public resource on scientific and technological developments that impact global security. Founded by Manhattan Project Scientists, the Bulletin's iconic "Doomsday Clock" stimulates solutions for a safer world.*

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## **EXPLORATIONS IN BASIC BIOLOGY**

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## **CLINICAL IMMUNOLOGY, PRINCIPLES AND PRACTICE (EXPERT CONSULT - ONLINE AND PRINT), 4**

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## **CLINICAL IMMUNOLOGY**

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*Elsevier Health Sciences* Written and edited by international leaders in the field, this book has, through two best-selling editions, been the place to turn for authoritative answers to your toughest challenges in clinical immunology. Now in full color and one single volume, the 3rd Edition brings you the very latest immunology knowledge - so you can offer your patients the best possible care. The user-friendly book and the fully searchable companion web site give you two ways to find the answers you need quickly...and regular online updates keep you absolutely current. Leading international experts equip you with peerless advice and global best practices to enhance your diagnosis and management of a full range of immunologic problems. A highly clinical focus and an extremely practical organization expedite access to the answers you need in your daily practice. Cutting-edge coverage of the human genome project, immune-modifier drugs, and many other vital updates keeps you at the forefront of your field. A new organization places scientific and clinical material side by side, to simplify your research and highlight the clinical relevance of the topics covered. A multimedia format allows you to find information conveniently, both inside the exceptionally user-friendly book and at the fully searchable companion web site. Regular updates online ensure that you'll always have the latest knowledge at your fingertips. Includes many new and improved illustrations and four color design. Your purchase entitles you to access the web site until the next edition is published, or until the current edition is no longer offered for sale by Elsevier, whichever occurs first. If the next edition is published less than one year after your purchase, you will be entitled to online access for one year from your date of purchase. Elsevier reserves the right to offer a suitable replacement product (such as a downloadable or CD-ROM-based electronic version) should access to the web

site be discontinued.

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## **PRINCIPLES OF MICROWAVE FERRITE ENGINEERING**

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John Wiley & Sons

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## **HOW PEOPLE LEARN**

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### **BRAIN, MIND, EXPERIENCE, AND SCHOOL: EXPANDED EDITION**

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National Academies Press First released in the Spring of 1999, *How People Learn* has been expanded to show how the theories and insights from the original book can translate into actions and practice, now making a real connection between classroom activities and learning behavior. This edition includes far-reaching suggestions for research that could increase the impact that classroom teaching has on actual learning. Like the original edition, this book offers exciting new research about the mind and the brain that provides answers to a number of compelling questions. When do infants begin to learn? How do experts learn and how is this different from non-experts? What can teachers and schools do—with curricula, classroom settings, and teaching methods—to help children learn most effectively? New evidence from many branches of science has significantly added to our understanding of what it means to know, from the neural processes that occur during learning to the influence of culture on what people see and absorb. *How People Learn* examines these findings and their implications for what we teach, how we teach it, and how we assess what our children learn. The book uses exemplary teaching to illustrate how approaches based on what we now know result in in-depth learning. This new knowledge calls into question concepts and practices firmly entrenched in our current education system. Topics include: How learning actually changes the physical structure of the brain. How existing knowledge affects what people notice and how they learn. What the thought processes of experts tell us about how to teach. The amazing learning potential of infants. The relationship of classroom learning and everyday settings of community and workplace. Learning needs and opportunities for teachers. A realistic look at the role of technology in education.

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## **EXPLORATIONS**

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### **AN OPEN INVITATION TO BIOLOGICAL ANTHROPOLOGY**

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Welcome to *Explorations and biological anthropology!* An electronic version of this textbook is available free of charge at the Society for Anthropology in Community Colleges' webpage here: [www.explorations.americananthro.org](http://www.explorations.americananthro.org)

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## **LEARNING AND UNDERSTANDING**

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### **IMPROVING ADVANCED STUDY OF MATHEMATICS AND SCIENCE IN U.S. HIGH SCHOOLS**

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National Academies Press This book takes a fresh look at programs for advanced studies for high school students in the United States, with a particular focus on the

*Advanced Placement and the International Baccalaureate programs, and asks how advanced studies can be significantly improved in general. It also examines two of the core issues surrounding these programs: they can have a profound impact on other components of the education system and participation in the programs has become key to admission at selective institutions of higher education. By looking at what could enhance the quality of high school advanced study programs as well as what precedes and comes after these programs, this report provides teachers, parents, curriculum developers, administrators, college science and mathematics faculty, and the educational research community with a detailed assessment that can be used to guide change within advanced study programs.*

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## **PRINCIPLES OF PROCESS PLANNING**

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### **A LOGICAL APPROACH**

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*Springer Science & Business Media* Process planning determines how a product is to be manufactured and is therefore a key element in the manufacturing process. It plays a major part in determining the cost of components and affects all factory activities, company competitiveness, production planning, production efficiency and product quality. It is a crucial link between design and manufacturing. There are several levels of process planning activities. Early in product engineering and development, process planning is responsible for determining the general method of production. The selected general method of production affects the design constraints. In the last stages of design, the designer has to consider ease of manufacturing in order for it to be economic. The part design data is transferred from engineering to manufacturing and process planners develop the detailed work package for manufacturing a part. Dimensions and tolerances are determined for each stage of processing of the workpiece. Process planning determines the sequence of operations and utilization of machine tools. Cutting tools, fixtures, gauges and other accessory tooling are also specified. Feeds, speeds and other parameters of the metal cutting and forming processes are determined.

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## **MODELS IN BIOLOGY**

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### **MATHEMATICS, STATISTICS, AND COMPUTING**

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*John Wiley & Sons Incorporated* This text provides an introduction to the use of mathematical models in biology, the statistical techniques for fitting and testing them, and associated computing methods. The properties of models, and methods of fitting and testing, are demonstrated by computer simulation illustrations.

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## **EVOLUTIONARY AND REVOLUTIONARY TECHNOLOGIES FOR MINING**

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*National Academies Press* The Office of Industrial Technologies (OIT) of the U. S. Department of Energy commissioned the National Research Council (NRC) to undertake a study on required technologies for the Mining Industries of the Future Program to complement information provided to the program by the National Mining Association. Subsequently, the National Institute for Occupational Safety and Health also became a sponsor of this study, and the Statement of Task was expanded to

include health and safety. The overall objectives of this study are: (a) to review available information on the U.S. mining industry; (b) to identify critical research and development needs related to the exploration, mining, and processing of coal, minerals, and metals; and (c) to examine the federal contribution to research and development in mining processes.

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## **MINERAL EXPLORATION DECISIONS**

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### **A GUIDE TO ECONOMIC ANALYSIS AND MODELING**

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Wiley-Interscience A guide to economic optimization of mineral exploration decisions--with detailed information on how to analyze risk and obtain a good measure of net value. Presents a unified approach to the various models used by mining companies to analyze mining prospects and evaluates and compares the models. Presents typical risk scenarios and shows how to apply the economic modeling process to actual situations.

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## **THE MOLECULAR BIOLOGY OF CYTOKINES**

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John Wiley & Sons Incorporated Series Editors Keith James, University of Edinburgh Medical School, UK Alan Morris, University of Warwick, UK This series is designed to bridge the gap between pure research in the biomedical sciences and its practical application in clinical medicine. The objective is to promote the understanding of the molecular basis of human physiology and disease, and new techniques for diagnosis and treatment. Primarily intended for graduate students of medicine, the books will also be of use to molecular biologists, biochemists, physiologists, pharmacologists and biotechnologists, as well as medical practitioners and technicians who seek to update their knowledge. *The Molecular Biology of Cytokines* Tony Meager National Institute for Biological Standards, Potters Bar, UK *The Molecular Biology of Cytokines* draws together the underlying themes and principles into one indispensable volume. Topics include: Molecular characteristics of cytokines and receptors Gene activation and cytokine production In vitro and in vivo properties Pathology, and Clinical applications This book will be an invaluable source of information for immunologists, haematologists and molecular biologists.

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## **BEST LIFE**

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*Best Life* magazine empowers men to continually improve their physical, emotional and financial well-being to better enjoy the most rewarding years of their life.

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## **THE DESIGN OF EXPERIMENTS**

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### **STATISTICAL PRINCIPLES FOR PRACTICAL APPLICATIONS**

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In all the experimental sciences, good design of experiments is crucial to the success of research. Well-planned experiments can provide a great deal of information efficiently and can be used to test several hypotheses simultaneously. This book is about the statistical principles of good experimental design and is intended for all applied statisticians and practising scientists engaged in the design, implementation

and analysis of experiments. Professor Mead has written the book with the emphasis on the logical principles of statistical design and employs a minimum of mathematics. Throughout he assumes that the large-scale analysis of data will be performed by computers and he is thus able to devote more attention to discussions of how all of the available information can be used to extract the clearest answers to many questions. The principles are illustrated with a wide range of examples drawn from medicine, agriculture, industry and other disciplines. Numerous exercises are given to help the reader practise techniques and to appreciate the difference that good design of experiments can make to a scientific project.

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## **BIOLOGICAL SCIENCE**

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### **EXPLORING THE SCIENCE OF LIFE**

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A fresh approach to biology centred on a clear narrative, active learning, and confidence with quantitative concepts and scientific enquiry. Spanning the breadth of biological science and designed for flexible learning, it will give you a deeper understanding of the key concepts, and an appreciation of biology as a dynamic experimental science.

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## **CIRCULAR DICHROISM**

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### **PRINCIPLES AND APPLICATIONS**

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Wiley-VCH Featuring an increased emphasis on biological molecules and extensive applications to organic stereochemistry and biopolymers, *Circular Dichroism: Principles and Applications, Second Edition* will prove a valuable and frequently consulted reference for organic chemists, biochemists, and medicinal and pharmaceutical chemists.

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## **TEACHING BY PRINCIPLES**

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### **AN INTERACTIVE APPROACH TO LANGUAGE PEDAGOGY**

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Addison-Wesley *Teaching by Principles* is a widely acclaimed methodology text used in language teacher education programs around the world. In this fourth edition, Dr. H. Douglas Brown and Dr. Keekyeong Lee offer a comprehensive survey of practical language teaching options firmly anchored in current research on second language acquisition and pedagogy.

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## **DEMOCRACY AND EDUCATION**

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Read Books Ltd This antiquarian volume contains a comprehensive treatise on democracy and education, being an introduction to the 'philosophy of education'. Written in clear, concise language and full of interesting expositions and thought-provoking assertions, this volume will appeal to those with an interest in the role of education in society, and it would make for a great addition to collections of allied literature. The chapters of this book include: 'Education as a Necessity of Life'; 'Education as a Social Function'; 'Education as Direction'; 'Education as Growth'; 'Preparation, Unfolding, and Formal Discipline'; 'Education as Conservative and

*Progressive'; 'The Democratic Conception in Education'; 'Aims in Education', etcetera. We are republishing this vintage book now complete with a new prefatory biography of the author.*

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## **FOOD PRODUCTION AND NATURE CONSERVATION**

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### **CONFLICTS AND SOLUTIONS**

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Taylor & Francis *Feeding the world's growing human population is increasingly challenging, especially as more people adopt a western diet and lifestyle. Doing so without causing damage to nature poses an even greater challenge. This book argues that in order to create a sustainable food supply whilst conserving nature, agriculture and nature must be reconnected and approached together. The authors demonstrate that while the links between nature and food production have, to some extent, already been recognized, until now the focus has been to protect one from the impacts of the other. Instead, it is argued that nature and agriculture can, and should, work together and ultimately benefit from one another. Chapters describe efforts to protect nature through globally connected protected area systems and illustrate how farming methods are being shaped to protect nature within agricultural systems. The authors also point to many ways in which nature benefits agriculture through the ecosystem services it provides. Overall, the book shows that nature conservation and food production must be considered as equally important components of future solutions to meet the global demand for food in a manner that is sustainable for both the human population and the planet as a whole.*

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## **PRINCIPLES AND APPLICATIONS OF GSM**

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Prentice Hall PLEASE PROVIDE COURSE INFORMATION PLEASE PROVIDE

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## **PRINCIPLES OF THE SOLID STATE**

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New Age International *Uses an integrated, scientists' approach to the principles regulating the synthesis, structure and physical characteristics of crystalline solids. Mathematical derivations are kept to a minimum. Covers electrical properties of metals and band semiconductors, superionic conductors, ferrites and solid electrolytes. Features end-of-chapter problem sets.*

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## **APPLIED CONTAMINANT TRANSPORT MODELING**

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Wiley-Interscience *The challenges facing groundwater scientists and engineers today demand expertise in a wide variety of disciplines—geology, hydraulics, geochemistry, geophysics, and biology. As the number of the subdisciplines has increased and as each has become more complex and quantitative, the problem of integrating their concepts and contributions into a coherent overall interpretation has become progressively more difficult. To an increasing degree transport simulation has emerged as an answer to this problem, and the transport model has become a vehicle for integrating the vast amount of field data from a variety of sources and for understanding the relationship of various physical, chemical, and biological processes. Applied Contaminant Transport Modeling is the first resource designed to*

provide coverage of the discipline's basic principles, including the theories behind solute transport in groundwater, common numerical techniques for solving transport equations, and step-by-step guidance on the development and use of field-scale modeling. The Second Edition incorporates recent advances in contaminant transport theory and simulation techniques, adding the following to the original text: -An expanded discussion of the role of aquifer heterogeneity in controlling solute transport -A new section on the dual-domain mass transfer approach as an alternative to the classical advection-dispersion model -Additional chemical processes and reactions in the discussion of reactive transport -A discussion of the TVD (total-variation-diminishing) approach to transport solution -An entirely new Part III containing two chapters on simulation of flow and transport under variable water density and under variable saturation, respectively, and a third chapter on the use of the simulation-optimization approach in remediation system design *Applied Contaminant Transport Modeling, Second Edition* remains the premier reference for practicing hydrogeologists, environmental scientists, engineers, and graduate students in the field. In 1998, in recognition of their work on the first edition, the authors were honored with the John Hem Excellence in Science and Engineering Award of the National Ground Water Association

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## **CHEMICAL PRINCIPLES OF ENVIRONMENTAL POLLUTION, SECOND EDITION**

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CRC Press An authoritative introduction to the scientific principles underlying environmental pollution, this book covers the transport, toxicity, and analysis of pollutants and discusses the major types of contaminant chemicals. Students will gain an understanding of the scientific principles of pollution at the chemical level and be able to approach the contentious issues in a rational way. Taking a pollution oriented approach, the authors discuss legislative limits, analysis of metals, oestrogenic chemicals, indoor and vehicular pollution, pesticides, dioxin-like substances, and more.

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## **CLINICAL COMMUNICATION IN MEDICINE**

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John Wiley & Sons Highly Commended at the British Medical Association Book Awards 2016 *Clinical Communication in Medicine* brings together the theories, models and evidence that underpin effective healthcare communication in one accessible volume. Endorsed and developed by members of the UK Council of Clinical Communication in Undergraduate Medical Education, it traces the subject to its primary disciplinary origins, looking at how it is practised, taught and learned today, as well as considering future directions. Focusing on three key areas - the doctor-patient relationship, core components of clinical communication, and effective teaching and assessment - *Clinical Communication in Medicine* enhances the understanding of effective communication. It links theory to teaching, so principles and practice are clearly understood. *Clinical Communication in Medicine* is a new and definitive guide for professionals involved in the education of medical undergraduate students and postgraduate trainees, as well as experienced and junior clinicians, researchers, teachers, students, and policy makers.

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## **NASA'S JOURNEY TO MARS: PIONEERING NEXT STEPS IN SPACE EXPLORATION**

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Government Printing Office *This document communicates NASA's strategy and progress to learn about the Red Planet, to inform us more about our Earth's past and future, and may help answer whether life exists beyond our home planet. Together with NASA's partners in academia and commercial enterprises, NASA's vision is to pioneer Mars and answer some of humanity's fundamental questions:*

- Was Mars home to microbial life? Is it today?
- Could it be a safe home for humans one day?
- What can it teach us about life elsewhere in the cosmos or how life began on Earth?
- What can it teach us about Earth's past, present, and future?

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## **GLOBAL ENVIRONMENT OUTLOOK - GEO-6: HEALTHY PLANET, HEALTHY PEOPLE**

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Cambridge University Press *Published to coincide with the Fourth United Nations Environmental Assembly, UN Environment's sixth Global Environment Outlook calls on decision makers to take bold and urgent action to address pressing environmental issues in order to protect the planet and human health. By bringing together hundreds of scientists, peer reviewers and collaborating institutions and partners, the GEO reports build on sound scientific knowledge to provide governments, local authorities, businesses and individual citizens with the information needed to guide societies to a truly sustainable world by 2050. GEO-6 outlines the current state of the environment, illustrates possible future environmental trends and analyses the effectiveness of policies. This flagship report shows how governments can put us on the path to a truly sustainable future - emphasising that urgent and inclusive action is needed to achieve a healthy planet with healthy people. This title is also available as Open Access on Cambridge Core.*

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## **THE TECHNOLOGY OF ECOLOGICAL BUILDING**

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### **BASIC PRINCIPLES AND MEASURES, EXAMPLES AND IDEAS**

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Birkhauser *This book is an introduction to the technology of ecological building in the sense of integrated planning: global prognoses and ecological cycles help to formulate guidelines for buildings in the future, standards that must be observed if we are to guard against environmental crises. The book presents the technology needed to integrate the supply of water, heat, cooling, electricity, natural ventilation and lighting into the building's structure and design from the start. In short, the book explains how to contribute now to the protection of natural resources by utilizing solar energy and rainwater, geothermal and other thermal systems, to name but a few.*

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## **THE BIOLOGY OF CITRUS**

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Cambridge University Press *Concise and heavily illustrated account of citrus biology, physiology, genetics and cultivation.*

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## **INTERNATIONAL RELATIONS, SECURITY AND JEREMY BENTHAM**

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*Psychology Press* This is the first book to present and discuss Jeremy Bentham's contributions to international relations theory. It introduces this brilliant thinker's insights and impact on world affairs with clarity and rigour. A major new contribution.

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## **THE PHILOSOPHY OF TEACHING**

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*Bloomsbury Academic*

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## **ECOSYSTEM-BASED MANAGEMENT, ECOSYSTEM SERVICES AND AQUATIC BIODIVERSITY**

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*Springer Nature* Aquatic ecosystems are rich in biodiversity and home to a diverse array of species and habitats, providing a wide variety of benefits to human beings. Many of these valuable ecosystems are at risk of being irreversibly damaged by human activities and pressures, including pollution, contamination, invasive species, overfishing and climate change. Such pressures threaten the sustainability of these ecosystems, their provision of ecosystem services and ultimately human well-being. Ecosystem-based management (EBM) is now widely considered the most promising paradigm for balancing sustainable development and biodiversity protection, and various international strategies and conventions have championed the EBM cause and the inclusion of ecosystem services in decision-making. This open access book introduces the essential concepts and principles required to implement ecosystem-based management, detailing tools and techniques, and describing the application of these concepts and tools to a broad range of aquatic ecosystems, from the shores of Lough Erne in Northern Ireland to the estuaries of the US Pacific Northwest and the tropical Mekong Delta.

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## **ACCESS AND BENEFIT SHARING OF GENETIC RESOURCES, INFORMATION AND TRADITIONAL KNOWLEDGE**

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*Taylor & Francis* Addressing the management of genetic resources, this book offers a new assessment of the contemporary Access and Benefit Sharing (ABS) regime. Debates about ABS have moved on. The initial focus on the legal obligations established by international agreements like the United Nations Convention on Biological Diversity and the form of obligations for collecting physical biological materials have now shifted into a far more complex series of disputes and challenges about the ways ABS should be implemented and enforced. These now cover a wide range of issues, including: digital sequence information, the repatriation of resources, technology transfer, traditional knowledge and cultural expressions, open access to information and knowledge, naming conventions, farmers' rights, new schemes for accessing pandemic viruses sharing DNA sequences, and so on. Drawing together perspectives from an interdisciplinary range of leading and emerging international scholars, this book offers a new approach to the ABS landscape; as it breaks from the standard regulatory analyses in order to explore alternative solutions to the intractable issues for the Access and Benefit Sharing of genetic resources. Addressing these modern legal debates from a perspective that

will appeal to both ABS scholars and those with broader legal concerns in the areas of intellectual property, food, governance, Indigenous issues, and so on, this book will be a useful resource for scholars and students as well as those in government and in international institutions working in relevant areas.

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## **REINFORCEMENT LEARNING, SECOND EDITION**

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### **AN INTRODUCTION**

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MIT Press *The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational approach to learning whereby an agent tries to maximize the total amount of reward it receives while interacting with a complex, uncertain environment. In Reinforcement Learning, Richard Sutton and Andrew Barto provide a clear and simple account of the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms, with the more mathematical material set off in shaded boxes. Part I covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-policy learning and policy-gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing, and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.*