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As COVID-19 has spread throughout the United States, it has reduced domestic economic activity and disrupted domestic and international supply chains for goods and services, including food and agricultural products. These disruptions have produced an immediate and very strong demand shock on the U.S. food supply chain. This book looks at current agricultural and food issues including: appropriations, trade, disaster assistance, food safety and security and loan programs.

Non-Market Valuation of Agriculture, Pasture and Forest Lands affected by Public or Private Investments

Majlinda Çakalli (Department of Economics and Rural Development, Agriculture University of Tirana, Tirana, Albania)

Infrastructure, energy or other large-scale public or private projects require acquisition, easement or rental of agriculture, pasture or forest land. Beside the specific country’s laws and regulations, investors have to follow various benchmarks applied by funding institutions as international standards. Together, these standards are designed to assure that adverse impacts on people, their rights, livelihoods, culture and environment are avoided or at least minimized, mitigated, offset and/or compensated. For these purposes, these projects are planned in remote rural areas, where there is a lack of land market because of limited transactions. A critical issue in this process is a fair economic valuation of agriculture, pasture or forest land using non-marked based valuation methods for compensation purposes. This scientific monograph proposes some simple yet solid methods to value agriculture, pasture or forest land which could be applicable by the local or central administration without necessarily requiring on complex methodologies requiring data which are generally not available. More importantly, such methodologies are also difficult to understand by the landowners making the public consultation process non-transparent. The methods applied have been tested with success in several large-scale projects involving acquisition, easement or rental of land parcels in different soil and climatic conditions belonging to thousands of owners. A series of template will help the valuators to integrate all the variables and standardize data presentation. It can serve as a reference to comply with land easement and acquisition strategies and aforementioned international standards, for example, the Performance Requirements of the European Bank for Reconstruction and Development (EBRD), Performance Standards of the International Finance Corporation (IFC).
Opportunities and Challenges of Smallholders and Smallholding
Donát Horváth
In series: Agriculture Issues and Policies
Publication Date: 02/05/2021
332 pp.
Hardcover: 978-1-53619-135-6, $230.00
e-book: 978-1-53619-203-2, $223.00
Smallholder farms or smallholdings comprise livestock and livestock, livestock and crops and crops and crops farming systems. It involves nutritional inter-relationships of integration and interdependency between livestock and crop systems and crop and crop systems. There are an estimated 500 billion smallholder farms worldwide supporting livelihoods of about 2 billion people, most of who are in Sub-Saharan Africa and Asia. Smallholders make more than 60% of agricultural producers supplying local and international food markets, and employ about 70% of farming communities in Sub-Saharan Africa and Asia. However, these farming systems experience financial, technological, infrastructural, market access, environmental and policy and institutional framework challenges. Considering the importance of smallholder farming systems, attempts should be geared towards mitigating the challenges and promoting productivity and sustainability of these farming systems. This is expected to lead to improved food and nutrition security and food safety and translate to improved livelihoods of smallholder farmers and increased income from agriculture products. The authors’ of this book focus on the challenges and opportunities of smallholders and smallholding systems all over the world.

Agricultural Engineering

Handbook of Technical Terms of Soil and Water Engineering
Mohammad Albaji (Department of Irrigation and Drainage, Faculty of Water & Environmental Engineering, Shahid Chamran University of Ahvaz, Ahvaz, Iran), Lamya Neissi (Department of Irrigation and Drainage, Faculty of Water & Environmental Engineering, Shahid Chamran University of Ahvaz, Ahvaz, Iran) and Soroor Hendali (Department of Soil Science, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran)
In series: Environmental Science, Engineering and Technology
Publication Date: 02/10/2021
384 pp.
Hardcover: 978-1-61324-110-3, $230.00
e-book: 978-1-53619-148-6, $230.00
This book is designed as a text for undergraduate soil and water engineering courses and as preliminary reading for postgraduate courses in soil and water engineering. It is hoped that it will also be of value to specialists, experts and engineers already in the field and to students preparing for the M.Sc. and PhD examinations. The texts and exercises are based on my lecture courses to undergraduate water science engineers augmented by material prepared for extramural short courses. Wherever possible, illustrations have been used to clarify the texts. The purpose of this book is to bring together and integrate in a single text the subject matter that deals with soil and water engineering. The book is divided into 24 chapters and is intended for students, researchers, and professionals working on various aspects of soil and water engineering. Various soil and water subjects have been discussed in the chapters.
Hordeum vulgare: Production, Cultivation and Uses
Naveen Eslem
In series: Agriculture Issues and Policies
Publication Date: 02/15/2021
167 pp.
Softcover: 978-1-53619-137-0, $95.00
e-book: 978-1-53619-248-3, $95.00
Chapter 1 looks at the planting techniques of barley noting that the bidirectional planting technique had a significant effect on growth and yield of barley. Chapter 2 provides information about the molecular approaches and mutation breeding in barley. Late spring frosts and drought are the most important abiotic stress factors that definite the yield and quality performance of spring barley genotypes in breeding programs. For this purpose, the authors of Chapter 3 used in their study a total of 25 spring barley genotypes, including 20 advanced line and 5 standard varieties. The next chapter looks at the composite of barley and the health effects it has. The last chapter, the author performs a study that investigates the effects of the short-term application (1 and 5 days) of arsenic, cadmium, and lead (15μM, 30μM, and 60μM mixtures) on the phenolic contents of a barley species that was registered by the Trakya Agricultural Research Institute in 2014.

Oryza sativa: Production, Cultivation and Uses
Herman N. Kearns
In series: Agriculture Issues and Policies
Publication Date: 02/17/2021
198 pp.
Hardcover: 978-1-53619-112-7, $160.00
e-book: 978-1-53619-256-8, $160.00
Chapter 1 focuses on some of the steps needed to increase the rate of growth in rice production especially for meeting the demands of population growth. Chapter 2 discusses the various conventional approaches used for rice improvement. Chapter 3 examines the role of SSR markers in breeding and improvement of rice. Following the finding that Microbispora are the dominant genus of Actinobacteria in rice (Oryza sativa L.) plants grown in a Vertisol soil from Yanco, NSW, Australia, the authors of Chapter 4 decided to test the hypothesis whether this observation was rice cultivar- or soil-dependent. Four rice cultivars grown in four agricultural soils were subjected to comparative assessment of their root and shoot endophytic actinobacterial population diversity, employing a classical culture-dependent approach as well as 16S rRNA gene PCR T-RFLP as the culture-independent method. Chapter 5 focuses on many issues pertaining to the development of temperate and cold-tolerant rice varieties suitable for cultivation under irrigated conditions in Kashmir valley and the hills around it. We discuss the issues, the progress, and the way forward for rice research in this very significant Himalayan region where rice is a staple food. The last chapter deals with the present distribution of the pest, adult description, host plants, life history, ecology, its association with various plant pathogens, damage and effect on yield, natural enemies and management practices.

Sweet Potatoes: Growth, Development and Harvesting
Lucas Courtois
In series: Agriculture Issues and Policies
Publication Date: 10/02/2020
128 pp.
Softcover: 978-1-53618-611-6, $82.00
e-book: 978-1-53618-638-3, $82.00
Sweet Potatoes: Growth, Development and Harvesting introduces the potential benefits of sweet potato as a promising food crop for processing into baked foods and snacks, thus reducing production costs and providing economic efficiency for sweet potato producing countries. The development of flour from sweet potato through the application of special technology, particularly bioprocessing (fermentation) and physical treatment, is discussed. The concluding study evaluates the agronomic performance of eight selected sweet potato cultivars obtained from Embrapa Hortaliça’s germplasm bank, including
Zea mays L.: Cultivation, and Uses
Sarah Dunn
In series: Agriculture Issues and Policies
Publication Date: 02/09/2021
103 pp.
Softcover: 978-1-53619-181-3, $82.00
e-book: 978-1-53619-204-9, $82.00
Zea mays L. is a potential producer of cereal crops and the dominant primary energy source of feed for monogastric animals, such as poultry. The first chapter in this book aims to determine the potential of phytase-producing endophytic bacteria, as an invisible avail for Zea mays L. High phytate levels in maize seeds is a problem encountered when used as raw material in poultry feed. The second chapter of this book focuses on the physical traits, chemical composition, and their relationship with wet-milling properties and nutritional quality parameters of maize hybrids of different maturity groups and various endosperm types (dent, semi-dent and flint). Finally, Mesoamerican cultures are generally regarded as advanced societies that, among other contributions to humanity, are known to have domesticated cultivated plants as Zea mays. Maize is one of the staple foods of the Mexican population and the practice of nixtamalization of maize seeds before Spanish conquest in 1521, is fundamental in the preparation of dough for tortillas. The last chapter examines the effect of salicylic acid in maize bioproductivity.

Farming

Farmers and Farming: Practices, Management and Challenges
Frederikke Poulsen
In series: Agriculture Issues and Policies
Publication Date: 10/02/2020
177 pp.
Softcover: 978-1-53618-463-1, $95.00
e-book: 978-1-53618-598-0, $95.00
Farmers and Farming: Practices, Management and Challenges opens with a focus on livelihood, which refers to the way people make a living. Livelihoods are the means people use to support themselves, to survive and to prosper. Next, the authors aim to analyze the socio-economic features of farmers involved in organic cultivation, exploring landholding patterns in the northern part of Karnataka state. They also explore how gender-based farming systems analysis could be used to simulate the effects of a change in agricultural practices on gender relations, either with the aim to do no harm or with the objective to achieve more gender equality. In closing, an overview on the potential and setbacks of intercropping in maintaining crop yields in changing climate in smallholder farmers in ESA set-up.

Horticulture

Vitis: Biology and Species
António Manuel Jordão (Professor of Oenology, Polítechnic Institute of Viseu, Agrarian Higher School, Chemistry Research Centre, Food and Wine Lab, Vila Real, Viseu, Portugal) and Renato V. Botelho (Research Group in Fruit Crops and Post-Harvest Department of Agronomy State University of Mid-Western of Paraná, Brazil)
In series: Horticulture, Viticulture and Viniculture
Publication Date: 09/02/2020
395 pp.
Hardcover: 978-1-53618-308-5, $230.00
e-book: 978-1-53618-424-2, $230.00
The vine is one of the oldest plants on the planet, whose remote fossils date back more than 120 million years ago. It has been part of human civilization since ancient times, with many indications of its use for consumption and cultivation in various archaeological and historical sites. Until today, the vine is very present in modern society, with great socioeconomic and cultural importance in many countries. The taxonomy of the genus Vitis has been the subject of a lot of discussion, however it is generally considered to comprise two distinct sections: Muscadinia and Euvitis. It is clear that genus Vitis shows an impressive genetic variability for many agronomic characteristics being strongly conditioned by the climatic and soil conditions where the plants are implanted.

Thus, written by a group of international viticulture researchers, “Vitis: Biology and Species” is a book that provides up-to-date reviews, overviews and summaries of current research on the most recent developments in Vitis species characterization, biology and composition. This book is composed by thirteen chapters that provide current research on different topics of recent knowledge about native grape varieties from different origins, the impact of different climatic and soil conditions on vine managements, the description of the main grapevines disease and their control, grape varieties composition and the use of modern digital technologies on viticulture. By reading this book, readers can find an excellent description of the state-of-the-art information and perspectives regarding to the most recent studies on the different dimensions of Vitis plants production. This new book is an important publication, which will be of great use to winegrowers, vine and wine scientists, students and other professionals that might be interested in reading and learning about some fascinating areas of vine research and discovery the most recent tendencies of vine biology and species.

Sustainable Soil Fertility Management
Hanuman Singh Jatav (Assistant Professor, Department of Soil Science and Agriculture Chemistry, Sri Karan Narendra Agriculture University, Jobner, Jaipur (Rajasthan) India), Dr. Satish Kumar Singh (Professor, Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, India), Dr. Vishnu D. Rajput (Academy of Biology and Biotechnology, Southern Federal University, Rostov-on-Don, Russia) and Dr. Tatiana Minkina (Academy of Biology and Biotechnology, Southern Federal University, Rostov-on-Don, Russia)

In series: Agriculture Issues and Policies
Publication Date: 02/10/2021

342 pp.
Hardcover: 978-1-53619-055-7. $230.00

Sustainable Soil Fertility Management mainly focuses on issues related to soil management at the field level, which is a prime concern for crop production that may be improved by adopting several sustainable management practices. Soil fertility is the capability of soil to sustain plant growth and optimize crop yield. This can be enhanced through the use of organic and inorganic fertilizers. Several techniques are suggested that enhance soil fertility and crop production while minimizing environmental impact. Soil fertility can be further improved by incorporating cover crops that add organic matter to the soil, which leads to improved soil structure and promotes a healthy, fertile soil; by using green manure or growing legumes to fix nitrogen from the air through the process of biological nitrogen fixation; and by microbes. Fertile soil contains all the major nutrients necessary to sustain basic plant nutrition (e.g., nitrogen, phosphorus, and potassium), as well as other nutrients needed in smaller quantities (e.g., calcium, magnesium, sulfur, iron, zinc, copper, manganese, boron, molybdenum, nickel). The book focuses on global strategies with a possible solution for managing the fertility of soil. The book covers soil science, soil fertility, crop production, soil sustainability, and soil management with a modern scientific approach that is helpful for researchers, the scientific community, academicians, business farmers and policymakers.
Special Topics

Agricultural Research Updates. Volume 30
Prathamesh Gorawala and Srushti Mandhatri
In series: Agricultural Research Updates
Publication Date: 10/16/2020
241 pp.
Hardcover: 978-1-53618-719-9. $250.00
e-book: 978-1-53618-721-2. $250.00
Agricultural Research Updates. Volume 30 provides a detailed update on the production of salt-tolerant plants through molecular breeding and genetic engineering. Future prospects and concerns, along with the importance of novel techniques elucidating the genetic basis of salt-tolerance are also discussed.
Next, a holistic framework for understanding and assessing the governance sustainability of Bulgarian agriculture is presented. This new approach is tested through a large-scale study for assessing the governance sustainability of a country’s agriculture at national, sectoral, regional, eco-system and farm levels.
The authors go on to study the influence of abiotic factors such as temperature and water potential on the growth of E. turcicum on different crop residues used in rotations with maize under no-till system cultivation.
In addition, strategies for minimizing food waste proposed by different organizations and countries that face the common challenge of achieving the participation of all sectors of society are analyzed.
Later, male organ development in Brassica oleracea contributing the embryology of the Brassicaceae family is investigated, along with the beginning, advanced and final stages of programmed cell death in anther cell walls by cytochemical, biochemical and molecular processes.
Two investigations were carried out in northwest Italy in an effort to highlight the importance of tannin quantity and quality on pastures, particularly focusing on the way this can affect milk quality during the grazing season due to changes in nutritional composition.
The closing study focuses on Cannabis sativa L., or hemp, an annual, dioecious plants distributed especially in the northern hemisphere. Hemp plant contains at least 113 different phytocannabinoids and a diverse class of psychoactive compounds.

Agricultural Research Updates. Volume 31
Prathamesh Gorawala and Srushti Mandhatri
In series: Agricultural Research Updates
Publication Date: 12/02/2020
243 pp.
Hardcover: 978-1-53618-881-3. $250.00
e-book: 978-1-53618-919-3. $250.00
This compilation opens with a review of water productivity throughout the world, which may be a useful tool for water users and governments to establish their programs and strategies.
The authors present the main technical aspects of modern surface irrigation systems, their capabilities for reducing water demand, and challenges for increasing water productivity.
Additionally, the agronomic production, nutritional composition, human health benefits, nutritional breeding, and marketing opportunities regarding kale are reviewed.
In one study, the authors attempt to characterize a hamburger sandwich made from cashew stalk, oat bran and cashew nut emulsion through an experimental study carried out between March and May of 2017.
Subsequently, the histological factors of salt tolerance in arbuscular mycorrhizal fungi inoculated strawberry plants are evaluated.
The authors provide an overview of the functionality of milk components in chocolate as well as the applications of milk powders in the manufacture of chocolate.
This compilation opens with a review of the past and present literature related to conservation tillage practices in durum wheat production and analyses the problems that arise from conservation tillage practices. Additionally, drought and salt tolerance are evaluated at an early stage of plant development in a collection of nine cultivated durum wheat cultivars (Triticum durum Desf.), using plants grown under hydroponic conditions.

The role of linear discriminant analysis and related chemometric methods in combination with liquid chromatography for the characterization, classification and authentication of foodstuffs and beverages is addressed.

This research investigates the prevalence of Campylobacter jejuni and its toxin genes, namely the cytolethal distending toxin gene, in selected vegetables that are commonly consumed raw in Kuala Terengganu, Malaysia. The Campylobacter jejuni isolated from selected vegetables is characterized against 10 types of antibiotics from six classes commonly used in clinical and agricultural settings, namely aminoglycosides, fluoroquinolones, glycopeptides, macrolides, beta-lactams, and tetracyclines.

The closing paper discusses the case of the kwebo, a low-cost, multi-purpose farm structure designed to be typhoon-resistant yet easy to construct, making use of prefabricated structural elements and construction aids.

Chapter one discusses the current information about the changes in chickpea’s nutritional value and health benefits given by its components after applying different kinds of food processes.

In the second chapter, the authors suggest a holistic framework for defining, evaluating and improving the governance of agroecosystem services in Bulgaria. The interdisciplinary Theory of Ecosystem Services and the New Institutional Economy are adapted, and an attempt is made to define the governance of agroecosystem services, to identify its agents, forms and mechanisms, to formulate an adequate criterion for evaluating its efficiency, and to characterize the stages for its analysis and improvement.

The aim of the third chapter was to develop a new “ready-to-eat” semi-solid CF product by using HHP at 600 MPa and 50°C for 15 or 25 min combined with final microwave heating prior to consumption. Eight combinations with a formulation that includes raw or toasted CF, with or without lemon juice, were evaluated using physicochemical (color and protein content, mechanical and rheological behavior), microbiological and sensory analyses.

Subtropical Scientific Centre scientists (Sochi, Russia) have a task to select the most promising peach varieties of early, average and late maturation that are grown in the region. The timing of fruit maturation depends on the climatic conditions of the area, so in chapter four authors gave a brief description of the varieties, based on their maturation time in the humid subtropics of Russia.

Chapter five, the authors discuss how they came to the conclusion that using the plant growth regulators in okra may be an effective strategy for improving growth, yield, and quality production.

In the last chapter, authors perform a study using anadenanthera colubrina var. cebil (leguminosae) to determine that the dynamic integration of the species biology, spatial ecology, and historical demographic events will provide valuable tools for a multi-scale understanding of gene dispersal processes and their consequences on genetic variability distribution.
Agricultural Research Updates. Volume 34
Prathamesh Gorawala and Srushti Mandhatri

In series: Agricultural Research Updates
Publication Date: 02/17/2021
244 pp.
Hardcover: 978-1-53619-260-5, $250.00
e-book: 978-1-53619-290-2, $250.00

This compilation begins by analyzing seed development in sunflowers, exploring in detail the molecular activity of sunflower seeds throughout their three phases of development. Chapter Two describes the nutraceutical values of Fenugreek, an annual herb native to southern Europe and Asia which is used in medicinal and nutritional contexts. Chapter Three discusses the necessity of pest management in agriculture and the negative consequences of pesticides, including health and environmental effects as well as the emergence of resistance in pests, and how innovations in the development of bio-pesticides can address these problems. Chapter Four presents the use of nanomaterials for production, protection, and quality improvement in Cucumis melo, a species of melon that has been developed into many cultivated varieties. Chapter Five also deals with Cucumis melo and discusses how breeding based on advanced molecular sequencing techniques can improve fruit quality. Finally, Chapter Six reviews the physiological and biochemical effects of Zinc stress on radish (Raphanus sativus L.), an economically important vegetable crop worldwide.

Climate Change and Agricultural Issues
Colin Buckland

In series: Agriculture Issues and Policies
Publication Date: 12/10/2020
285 pp.
Hardcover: 978-1-53618-971-1, $195.00
e-book: 978-1-53619-004-5, $195.00

Maintaining the health of our planet for future generations is of paramount importance, but so is feeding the billions of people that populate the earth today and in the years ahead. These topics and how they interact is complex and are discussed in this book.

Chemistry
Advances in Chemistry Research. Volume 67
James C. Taylor

In series: Chemistry Research Summaries
Publication Date: 03/04/2021
245 pp.
Hardcover: 978-1-53619-338-1, $250.00
e-book: 978-1-53619-375-6, $250.00

In the first chapter of this compilation, the author reviews the sorption properties of magnetite with respect to hexavalent chromium ions and the possibility of its use as a sorbent for removing these toxic ions from contaminated aqueous solutions. In the second chapter, the authors summarize the importance of oxadiazole in medicinal chemistry for the management of various diseases. The third chapter discusses the developing technology of carbon capture and storage, a technique to reduce the impact of greenhouse gases, and how ionic liquids can be leveraged in this context. Following this, the authors describe how methanol to gasoline processes, specifically those using zeolites and zeolite-based catalysts, provide a viable alternative route for gasoline production. The final chapter proposes a revision of the standard model of photosynthesis based on new understanding generated through gravitational mass spectroscopy.
Biochemistry

A Closer Look at Glycation
Nadeem Ahmad Ansari, PhD (Department of Biotechnology, Faculty of Engineering and Technology, KMC Language University, Lucknow, U.P., India)
In series: Biochemistry Research Trends
Publication Date: 03/04/2021
254 pp.
Hardcover: 978-1-53619-176-9. $195.00
e-book: 978-1-53619-243-8. $195.00
This well-planned, logically structured and user-friendly book provides a useful insight into the world of non-enzymatic glycation from its early stages to an advanced level, with an eye on glycating agents, their enhancers and inhibitors. All chapters are of equal interest but the chapters on dietary AGEs and effects of AGEs on bone cells provide novelty in the area of glycation. These chapters also describe characterization of the glycation and its role in different types of age-related complications and diseases. A chapter on synthetic and plant-based natural inhibitors of glycation is also presented.

Biochemistry and Biochemists: Who Were They and What Did They Discover?
Manuel F. Varela (Professor, Eastern New Mexico University, Science Department, Portales, New Mexico, USA), Ann F. Varela (Instructor, Eastern New Mexico University, Math and Science Department, Portales, New Mexico, USA) and Michael F. Shaughnessy (Eastern New Mexico University, School of Education, Portales, New Mexico, USA),
In series: Biochemistry Research Trends
Publication Date: 09/11/2020
319 pp.
Hardcover: 978-1-53618-493-8. $230.00
e-book: 978-1-53618-529-4. $230.00
The book Biochemistry and Biochemists: Who Were They and What did they Discover is an series of twenty five reviews regarding the top twenty five biochemists of the last two hundred years. The book chronicles the work and discoveries of research scientists from various parts of the world (Severo Ochoa of Spain, John Earnest Walker of Great Britain, Luis Leloir of France, Jens Skou of Denmark as well Masayusa Nomura of Japan). Some of these biochemists did foundational work (Albert Szent-Gyorgy in the realm of vitamin C ) and others did exemplary work into some of the most important realms of their time ( such as Dorothy Hodgkin and her explorations into the structures of penicillin and insulin ). Enzyme kinetics was explored and researched by Maud Menten and Leonor Michaelis.
The lives and explorations of these individuals as well as relevant anecdotes regarding their lives are explored in this book. For example, Jakub Karos Parnas, a well known scholar and researcher died in the famous Lyubyanka Prison in Moscow, although the exact cause of his death may never be known. Luis Leloir was born in the shadow of the Arc de Triomphe in Paris and went on to achieve greatness and crucial insights in sugar metabolism and glycogen biosynthesis. Some of these researchers investigated things as simple as water ( and their transporation into and out of cells ) and others offered such profound ideas such as Albert Kluyver and his comments that “all organisms do biochemistry”.
In a sense, all students of biochemistry as well as chemistry would do well to learn about these biochemists, their discoveries and a bit about their lives- as many led many challenging lives- such as escaping from the Germans in World War II. Each of the biochemists here in this text had something to offer the realm of science and many were rewarded with the highest honor imaginable- the Nobel Prize- and some of them succeeded in their chosen field of endeavor- even though they may have failed Anatomy and Physiology four times!
Investigations into DNA, ATP and these realms also are highlighted in this book as these fundamental concepts are obviously of critical importance in the realm of biochemistry. This book is first a serious exploration into the discoveries of these biochemists while at the same time an interesting examination of the lives, and loves and trials and tribulations of these biochemists who literally changed the face of biochemistry over the years.
Fermentation and Culturing

Beer: From Production to Distribution
Armand Legault
In series: Fermented Foods and Beverages in a Global Age
Publication Date: 09/18/2020
161 pp.
Softcover: 978-1-53618-414-3. $95.00
e-book: 978-1-53618-474-7. $95.00
This compilation provides a critical review of a tailor-made concept for the production of beer with high biological value, reviewing the changes in phenolic capacity and antioxidant activity of malt and hops as the main phenolic component sources in beer. A conceptualization and characterization of craft beer and a full description of the “craft beer revolution” phenomenon is provided, elucidating the increasing consumption of this beverage. A concluding study assesses the antioxidant activity of beer mainly due to endogenous phenolic compounds with high bioavailability, Maillard reaction products and sulfites.

Food Science and Technology

Antioxidant Properties and Health Benefits of Green Tea
Nishant Rai, PhD (Professor, Department of Biotechnology, Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India) and Jigisha Anand, PhD (Assistant Professor, Department of Biotechnology, Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India)
In series: Food and Beverage Consumption and Health
Publication Date: 01/27/2021
207 pp.
Hardcover: 978-1-53619-044-1. $160.00
e-book: 978-1-53619-122-6. $160.00
Derived from leaves of evergreen herb Camellia sinensis, green tea is known for its significant human health benefits. Once primarily consumed in Asia and North Africa, green tea is becoming increasingly available around the world with an increase in its average annual growth. There has been a tremendous change in the consumption pattern of green tea, a prime drive of which is the increasing knowledge about and marketing of its health benefits. The most notable health benefit of green tea is its powerful antioxidant potential, which helps prevent cellular damage from certain oxidation reactions in the body at the molecular level. Green tea is attributed to health claims which include the prevention of skin cancer, lower blood pressure, the prevention of cardiovascular diseases, neurodegenerative and kidney disorders, diabetes, respiratory distress, the inhibition of clinical and opportunistic microbial infections, and many more. The rich presence of polyphenols in green tea is likely responsible for its multiple health benefits. In vitro and in vivo epidemiological evidence suggests the importance of green tea polyphenols in exerting antioxidant activities which confer medicinal and food value. Major polyphenols found in green tea include the catechins, such as epigallocatechin gallate, epigallocatechin, epicatechin 3-gallate, epicatechin, and catechin gallate. These catechins have shown promise in the promotion of cardiovascular health, the prevention of cancer, skin protection, the reduction of high cholesterol levels, diabetes, impaired immune function, diarrhoea, fatigue and infection. There is a highly significant relationship between phenolics, flavonoids and the antioxidant activity of green tea, while the amount of phenolic, flavonoids and antioxidants are the parameters depicting the quality of tea according to their biological properties.
This book is an informative forum highlighting research on the antioxidant activity of green tea pertaining to its health benefits. The book is organised into seven chapters that provide a comprehensive review of the antioxidant activity of green tea and its associated health benefits. The book outlines useful information and improves the fundamental knowledge regarding the processing of green tea, its chemical components, their role as antioxidants and usefulness as nutraceuticals.
Cajanus cajan: Cultivation, Uses and Nutrition
Donald S. Wilkes

In series: *Food Science and Technology*
Publication Date: 02/09/2021
164 pp.
Softcover: 978-1-53619-134-9, $95.00
E-book: 978-1-53619-223-0, $95.00

Pigeon pea (Cajanus cajan (L.), among legumes, has an important role in the diet of many people in the world. It is one of the oldest food crops. It is the sixth most important legume crop. Pigeon pea is rich in protein, carbohydrates, and dietary fiber, and a rich source of other bioactive components. Pigeon pea is a good source of dietary fiber and is low in fat, which helps in the maintenance of body weight and reduces the risk of cardiovascular diseases. Cytoplasmic male-sterility (CMS) refers to the condition in plants where they fail to produce functional pollen.

In Chapter 1, the authors briefly discuss cytoplasmic male-sterility and its utilization in hybrid breeding in plants. Then they describe a historical overview of the discovery of male-sterility in pigeon pea. Next, a retrospective view on the major CMS systems developed and their use in commercial hybrid seed production in pigeon pea is presented. Finally, genomic approaches for stimulating pigeon pea hybrid breeding are briefly discussed.

In Chapter 2, the authors focus on the pharmacological and medicinal properties of pigeon pea. Next, the chemical composition of pigeon pea, its nutritional value, phytochemical components, health benefits and its usefulness in formulating functional foods is examined. In the final and fourth chapter, the cultivation, uses and other important nutritional information about this important legume is explored.

Cinnamon: Nutrition, Consumption and Health
Joseph M. Croce

In series: *Food Science and Technology*
Publication Date: 11/06/2020
142 pp.
Softcover: 978-1-53618-679-6, $82.00
E-book: 978-1-53618-703-8, $82.00

Cinnamon: Nutrition, Consumption and Health first explores the benefits of cinnamon and its components on metabolic impairments in diabetes, a disorder caused by impaired insulin release and action, and defective metabolisms of nutrients such as carbohydrates, lipids, and proteins. In addition, the authors discuss the antioxidant, antimicrobial, and flavor properties of cinnamon and its potential as a functional ingredient.

A study was conducted to evaluate the effects of chitosan nano-encapsulating mint, thyme and cinnamon essential oils on performance, immune responses and intestinal bacteria population in broiler chickens.

In closing, the causes of variations of compounds present in cinnamon essential oil are reviewed, such as: climatic conditions, drying conditions, extraction methods, and the analysis method for chemical characterization.

Consumption and Contamination of Dairy Products
Egor Vagin

In series: *Food and Beverage Consumption and Health*
Publication Date: 10/16/2020
140 pp.
Softcover: 978-1-53618-654-3, $82.00
E-book: 978-1-53618-674-1, $82.00

In Consumption and Contamination of Dairy Products, the authors first describe the microbiological, physicochemical and sensory properties of a traditional Michouna cheese produced from goat and cows’ milk in East of Algeria. A description of the microbiological analyses of 128 samples of different dairy products produced by an establishment located in the Marche region, Central Italy, is provided. The results demonstrate good manufacturing conditions.

One of the main fermented milk drinks consumed in Algeria, Iben, is characterized, recording the absence of all pathogenic micro-organisms and mold.

To examine the consumers’ acceptance of bakery products incorporating whey residue, a by-product of the cheese industry, a descriptive cross-sectional study was conducted through a questionnaire survey on a non-probabilistic sample composed of 299 participants.

In closing, the authors present some results of a questionnaire survey carried out in Portugal and Brazil, investigating the consumption habits of some classes of dairy product.
Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Distilled Beverages
Maurício Bonatto Machado de Castilhos (Department of Exact Sciences and Earth Department, Minas Gerais State University, Frutal, Minas Gerais, Brazil), Vanildo Luiz Del Bianchi (Food Engineering and Technology Department, São Paulo State University, São José do Rio Preto, São Paulo, Brazil) and Vitor Manfroi (Institut of Food Science and Technology, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil)
In series: Fermented Foods and Beverages in a Global Age
Publication Date: 01/21/2021
191 pp.
Softcover: 978-1-53619-026-7. $95.00
e-book: 978-1-53619-053-3. $95.00

Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Distilled Beverages presents relevant material regarding distilled alcoholic beverage technologies and their variations, including current information about their chemistry and sensory profiles. The book aims to offer evidence regarding the use of novel technologies in distilled alcoholic beverages and focuses on the importance of the relationship between chemical and sensory approaches. This information will be useful for distilled alcoholic beverage producers, scientists, professors, and as targeting material for food science, technology and engineering graduate and post-graduate students. This book includes six chapters on the following subjects: cachaça, cognac, pisco, rum, mezcal and tequila, and tiquira (spirit of manioc), and provides information concerning the use of novel technologies in the distilled alcoholic beverage field, comparing them with the classical technologies used worldwide. Useful data is provided regarding the effects of these novel technologies on chemical properties and sensory wine acceptance, as well as on descriptive profiles aimed at assessing the changes promoted in the chemical profile of distilled alcoholic beverages as a result of the improvement of their quality and sensory uniqueness.

Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Fermented Beverages
Maurício Bonatto Machado de Castilhos (Department of Exact Sciences and Earth Department, Minas Gerais State University, Frutal, Minas Gerais, Brazil), Vanildo Luiz Del Bianchi (Food Engineering and Technology Department, São Paulo State University, São José do Rio Preto, São Paulo, Brazil) and Vitor Manfroi (Institut of Food Science and Technology, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil)
In series: Fermented Foods and Beverages in a Global Age
Publication Date: 01/21/2021
202 pp.
Softcover: 978-1-53618-984-1. $95.00
e-book: 978-1-53619-051-9. $95.00

Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Fermented Beverages presents relevant material regarding fermented alcoholic beverage technologies and their variations, including current information about their chemistry and sensory profiles. The book aims to provide crucial evidence regarding the use of novel technologies in fermented alcoholic beverages and discusses the relationship between chemical and sensory approaches, since both are closely related. This information will be useful for fermented alcoholic beverage producers, scientists and professors, and will be helpful as material for food science, technology and engineering graduate and post-graduate students. This book includes six chapters with the following subject matter: white wines, sparkling wines, cider, mead, beers and craft beers. The distinctiveness of this book lies in the fact that it provides information concerning the use of novel technologies in the fermented alcoholic beverage field, comparing those with classical technologies that have been used worldwide. The book provides useful data regarding the impact of these novel technologies on chemical properties, sensory acceptance and descriptive profiles, with the goal of assessing the changes promoted in the chemical profile of fermented alcoholic beverages as a result of their quality improvement and sensory uniqueness.
Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Red Wines
Mauricio Bonatto Machado de Castilhos (Department of Exact Sciences and Earth Department, Minas Gerais State University, Frutal, Minas Gerais, Brazil), Vanildo Luiz Del Bianchi (Food Engineering and Technology Department, São Paulo State University, São José do Rio Preto, São Paulo, Brazil) and Vitor Manfroi (Institut of Food Science and Technology, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil)
In series: Fermented Foods and Beverages in a Global Age
Publication Date: 01/21/2021
246 pp.
Softcover: 978-1-53618-985-8, $95.00
e-book: 978-1-53619-052-6, $95.00
Fermented and Distilled Alcoholic Beverages: A Technological, Chemical and Sensory Overview. Red Wines presents relevant material regarding red wine technologies and their variations, including current information about their chemistry and sensory profiles. The book provides crucial evidence regarding the use of novel technologies in red wines and discusses the relationship between chemical and sensory approaches, since both are closely related. This information will be useful for red wine producers, scientists and professors, and will be helpful as material for food science, technology and engineering graduate and post-graduate students. This book includes seven chapters with the following subject matter: red wines produced from American grapes (Vitis labrusca) (Brazil), Bordeaux Cabernet Sauvignon and Merlot (France), Tempranillo (Spain), Touriga Nacional (Portugal), Tannat (Uruguay), and Syrah (Brazil) grapes. The distinctiveness of this book lies in the fact that it provides information concerning the use of novel technologies in red wine production, comparing those with classical technologies used worldwide. The book provides useful data regarding the effect of these novel technologies on chemical properties, sensory wine acceptance and descriptive profiles, assessing the changes promoted in the wines’ chemical profile as a result of the their quality improvement and sensory uniqueness.

Fermented Foods: Nutrition and Role in Health and Disease
Oliver Kovalyov
In series: Food and Beverage Consumption and Health
Publication Date: 10/09/2020
296 pp.
Hardcover: 978-1-53618-656-7, $195.00
e-book: 978-1-53618-705-2, $195.00
Fermented Foods: Nutrition and Role in Health and Disease provides a comprehensive review of the recently discovered, or bioengineered, vitamin B2, B9 and B12-producing lactic acid bacteria, providing an in depth analysis of the latest biotechnological applications and potentialities, particularly the development of novel bioenriched fermented foods. The authors elucidate the impact of lactic acid fermentation on sulforaphane rich products in an effort to improve our understanding on the role of sulforaphane as a potential medicine in the treatment of various disorders. A proteinaceous compound produced by Leuconostoc lactis RK18 is characterized, isolated from a fermented Cambodian food product. Later, fermented meat products and fermented shrimp products are discussed, particularly focusing on their production, composition, microorganisms, health benefits and health risks.

Kefir: Nutrition, Consumption and Health Benefits
Larry B. Lewis
In series: Food and Beverage Consumption and Health
Publication Date: 11/04/2020
208 pp.
Hardcover: 978-1-53618-805-9, $160.00
e-book: 978-1-53618-853-0, $160.00
Kefir is a type of fermented, acidic, slightly alcoholic drink with a creamy consistency, resulting from the fermentation of microorganisms that live in symbiosis in traditional grains or lumps of kefir. Kefir: Nutrition, Consumption and Health Benefits reviews the current literature and presents a “study of art” relating to kefir and its technological advances in product development.
The level of microorganisms found in kefir grain are reviewed, along with the ratio of microorganism species to each other, the incubation temperature applied in production, its duration and the storage time of kefir grain.

**Meat Products: Chemistry, Consumption and Health Aspects**
Marcela Paola Castro, PhD(Laboratorio de Microbiología de Alimentos, Departamento de Ciencias Básicas y Aplicadas, Universidad Nacional del Chaco Austral, Argentina; Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) de la República Argentina) and María Elisa Cayré, PhD(Laboratorio de Microbiología de Alimentos, Departamento de Ciencias Básicas y Aplicadas, Universidad Nacional del Chaco Austral, Argentina)

In series: *Food and Beverage Consumption and Health*
Publication Date: 01/05/2021
263 pp.
Hardcover: 978-1-53618-978-0, $195.00
e-book: 978-1-53619-020-5, $195.00

Meat and meat products have been consumed by humankind throughout time, and the rise of industrialization and mass production in the past century has made them more affordable and available. At the same time, meat and meat products have been blamed for causing cancer and degenerative diseases. Information regarding this has been often blatantly controversial, leading to misinterpretation, uncertainty, and fake news.

Rethinking the role of meat in human nutrition is a present challenge for the food industry. To address this, we must look towards green and clean technologies that adhere to the fundamental principles of environmental care.

This book includes comprehensive reviews of hot topics relating to meat products. The reader will find current information and scientific evidence about emerging technologies, modern trends and future perspectives on the subject, with emphasis placed on chemical and health aspects.

The COVID-19 pandemic has proved that we cannot continue with business as usual. The inevitable consequences of “the old normal” (zoonotic disease, antimicrobial resistance, climate change and food insecurity) will not revert. As we move into the next decade and beyond, we need a more healthy, sustainable and fair food system. This book aims to contribute to build a better scenario for subsequent consumer generations. Today more than ever, food scientists are leading actors in the international scene.

**Milk: Nutrition, Consumption, and Health**
Amal Bakr Shori (Faculty of Science, Department of Biological Sciences, King Abdulaziz University, Jeddah, Saudi Arabia)

In series: *Food and Beverage Consumption and Health*
Publication Date: 12/04/2020
162 pp.
Softcover: 978-1-53618-871-4, $95.00
e-book: 978-1-53618-927-8, $95.00

Milk is a highly nutritious medium permissive for the growth of many diverse bacterial species. It is a composite form of different dietary essentials like triglycerides, caseins, soluble milk proteins, milk peptides, sugars, minerals, vitamins, and enzymes. On the one hand, there is increasing interest in the applications of compounds produced by dairy starter cultures due to strong consumer demand for healthy fermented milk products. On the other hand, it is a highly perishable commodity and poor handling can exert a public health and economic toll, thus requiring hygienic vigilance throughout the production-to-consumer chain. This comprehensive book will mainly focus on factors affecting the composition and nutraceutical properties of milk and their functional value from different dairy animals.

The book presents factors affecting the composition and nutraceutical properties of milk in different dairy animals, provides information on the microbiota of raw milk, and provides information on the nutritional manipulation of milk nutrients to increase functional value.
Properties and Uses of Vegetable Oils

Dr. Yashvir Singh (Department of Mechanical Engineering, Graphic Era Deemed To Be University, Dehradun, Uttarakhand, India) and Dr. Nishant Kr. Singh (Department of Mechanical Engineering, Hindustan College of Science and Technology, Mathura, UP India)

In series: Food Science and Technology
Publication Date: 02/24/2021
306 pp.
Hardcover: 978-1-53619-207-0. $230.00
e-book: 978-1-53619-245-2. $230.00

Vegetable oils are a group of fats derived from seeds, nuts, cereal grains, and fruits. It is important to understand that not all vegetable oils are liquid oils at ambient temperatures. Vegetable oils have enormous potential as alternatives for mineral oil in a myriad of industrial applications. Although our knowledge of the genes and biochemical pathways leading to the formation of plant oils allows for the potential to engineer a diverse array of lipid products in seed oils, this goal remains a challenge. This book identifies the prospects of vegetable oils for different applications that facilitate readers from academia, industry, and research laboratories to enhance their knowledge of utilizing vegetable oils in different industrial sectors.

Superfoods have been used for human consumption for centuries. These foods provide an important amount of essential nutrients and energy. Nowadays, the nutraceutical properties of superfoods have acquired importance due to their additional health benefits. Most superfoods are eaten in their fresh form in producing regions, but seasonality is an important limiting issue. Traditional processing technologies have been used to assure supply for the whole year, and innovative processing technologies have been developed to reach bigger markets.

In this book, the authors provide information about nutritional aspects of the described foods. Additionally, the different functional properties of each food, such as antioxidant, anticancer, hypoglycemic, and cardioprotective activities are discussed. It includes information about their principal bioactive compounds, biological activities, the effects of processing these compounds, nutritional values, and sensorial properties and shelf life. The first section is focused on the properties of selected fruits, some eaten fresh, others only after a first transformation. The second section is focused on a selection of foods having been transformed before human consumption, such as cereals, pseudocereals, and legumes. Finally, the third section includes a set of products from animal and diverse origins.
General Chemistry

**Advances in Chemistry Research. Volume 65**

*James C. Taylor*

In series: *Advances in Chemistry Research*

Publication Date: 10/16/2020

291 pp.

Hardcover: 978-1-53618-711-3. $250.00

e-book: 978-1-53618-734-2. $250.00

Advances in Chemistry Research. Volume 65 first discusses the cannabis plant, which is known as an attractive source of potential bioactive compounds that contribute to remedy a lot of diseases such as cancer, multiple sclerosis, arthritis, epilepsy, inflammatory bowel disease, and spinal cord disease, among others. Following this, the potential applications of intense pulsed light and non-thermal plasma in the milk powder industry are discussed, as well as the need for future efforts. Additionally, the various applications and uses of α- and β-pinene rich essential oils are discussed, such as antioxidant agents, anti-inflammatory agents, fungicidal agents, antiviral agents, antibacterial agents, insect repellants, antimicrobial agents and cytotoxic agents.

The authors provide an overview of the mechanistic pathways operating in molecular catalysis for water oxidation, ranging from the well-established ruthenium chemistry to the more recent and promising first row transition metal complexes. The catalytic aspects and mechanisms of water oxidation by ruthenium complexes are reviewed in an effort to provide insight on the design of efficient water oxidation catalysts. Later, a comprehensive description of transition metal chalcogenides based nanomaterials for noble metal-free electrocatalysts for oxygen reduction reaction is presented. The closing work studies the acetoxylation of alpha-pinene over activated carbons, which can be performed using solid materials such as zeolite, heteropolyacids and SBA-15 with sulfonic groups.

Organic Chemistry

**Branched-Chain Amino Acids: Metabolism, Benefits and Role in Disease**

*Michael T. Kidd (Professor and Holder of Adisseo Endowed Professorship in Global Sustainable Poultry Nutrition, Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, AR, USA)*

In series: *Chemistry Research and Applications*

Publication Date: 01/13/2021

344 pp.

Hardcover: 978-1-53618-833-2. $230.00

e-book: 978-1-53619-066-3. $230.00

The branched-chain amino acids are unique in chemical structure, metabolism, and that they are essential in the diet of both humans and monogastric food animals. Whether you are a health professional looking to increase your knowledge of amino acid nutrition on disease, health, and aging, or an agriculture scientists looking to broaden your knowledge of factors influencing amino acid requirements, this text is a must. This book represents three diverse sections encompassing eleven chapters in total. Section one, being the largest, consist of six chapters addressing the role of branched-chain amino acids in domestic animal and human health. Endocrine and antioxidant systems affected by branched-chain amino acid status are presented, as well as biochemical and molecular mechanisms behind their responses. Moreover, the pros and cons of branched-chain amino acid therapy and balance in sports nutrition, catabolic injury recovery, disease, and successful aging are presented. The second and third sections of this text are similarly unique, in that they contain five chapters addressing diet needs, digestion, intestinal metabolism, absorption, and subsequent whole-body metabolism at the biochemical and molecular level. Further, two different meta-analyses have been composed using independent branched-chain amino acid data for assessment of food animal needs, in addition to providing insights for controlling metabolic homeostasis via diet formulation. Lastly, and specific for food animal production, the most limiting branched-chain amino acids in swine and poultry diets (e.g., valine and isoleucine) are poised to gain popularity and further price competitiveness in their crystalline L-amino acid forms, and thus, have tremendous environmental implications in terms of planetary nitrogen and water cycling.
Chalcones and Their Synthetic Analogs
Pál Perjési, Ph.D (Institute of Pharmaceutical Chemistry, University of Pécs, Pécs, Hungary)

In series: Chemistry Research and Applications
Publication Date: 11/04/2020
357 pp.
Hardcover: 978-1-53618-709-0. $230.00
e-book: 978-1-53618-794-6. $230.00

Chalcones is a collective name of natural and synthetic compounds with a 1,3-diaryl-2-propen-1-one moiety. Natural chalcones are biogenetic precursors of the flavonoids in higher plants. They belong to one of the major classes of naturally occurring compounds with widespread distribution in different plant families. Natural and synthetic chalcones display a wide variety of pharmacological effects, including antibacterial, antiprotozoal, antimalarial, anti-inflammatory activities, cytotoxicity towards cancer cell-lines, antitumor, and antitumor-promoting, activities. The chalcone scaffold is one of the natural privileged structures, which possess geometry suitable for decoration with side chains, such that the resulting products bind to different target proteins. The present contribution summarizes up-to-date summary of their synthetic methods, UV, IR and MS characterization, covalent and noncovalent interactions under cellular conditions, as well as antimalarial and anti-inflammatory actions of natural and synthetic derivatives. Synthesis and spectroscopic properties of not only chalcones but their conformationally restricted analogs are also discussed. Furthermore, synthetic methods and biological activities of C5-curcuminoids, a class of compounds with the related 3-aryl-2-propen-1-one moiety, are summarized. The respective chapters discuss the known structure-to-spectroscopic characteristic and structure-to-biological activity relationships as well.

Sulfonamides: An Overview
Debayan Sarkar, Ph.D. (Department of Chemistry, National Institute of Technology, Rourkela, India)

In series: Chemistry Research and Applications
Publication Date: 11/16/2020
359 pp.
Hardcover: 978-1-53618-157-9. $230.00
e-book: 978-1-53618-911-7. $230.00

This book presents comprehensive accounts of the chemistry revolving around the sulphonamides. Sulfonamides are widely present in various drugs as a functional group and are a manmade synthetic drug. Hence, their extended research is a prerequisite for every practitioner of organic chemistry. Chapter 1 introduces the synthesis, reactivity, acidity, and pharmaceutical properties of the sulphonamides. It highlights the synthesis of biologically active sulphonamides, the study of their biological activity by QSAR method, and their medical applications. Chapter 2 deals with the classification of sulphonamides (i.e. acyclic and cyclic) and their structural activity relationship. It also describes the application of sulphonamides in pharmaceuticals as antimicrobial, anti-diabetic, anti-viral, anti-cancer, anti-inflammatory and anti-malarial agents. Chapter 3 reviews the synthetic attempts towards sulphonamide synthesis by employing the fixation of sulphur-dioxides. These approaches have been categorized into three parts: a) transition metal-catalyzed, b) employing Lewis acid, c) photocatalytic. Chapter 4 discusses the use of sulphonamides as potent organocatalysts, briefly describing how the mono- and C2-symmetric bis-sulphonamides act as efficient bifunctional and multifunctional organocatalysts in the enantioselective Michael addition of carbonyl compounds to α,β-unsaturated compounds. Chapter 5 details the oxidative sulphonamidation of alkenes and dienes, which also direct the routes to the synthesis of numerous heterocycles and linear compounds. Special emphasis is given to the comparison of reactivity of triflamides, arenesulfonamides, and the deprotection of sulphonamides. Chapter 6 describes the therapeutic properties of sulphonamides, which are significantly increased by the presence of the metal ions and ligands. This complex generation provides the opportunity to exploit the unique properties of metal centers, such as multiple oxidation states, redox properties, a wide variety of coordination numbers, symmetries and structural patterns, which offer highly adaptable platforms for drug design. Chapter 7 provides an overview of the clinical applications of sulphonamides on the toxicity and pharmacokinetic aspects of various sulpha-drugs. The mechanism involved in the development of sulphonamide resistance is briefly discussed. Thus, this book summarizes important attempts undertaken by chemists and biologists worldwide in the area of sulphonamides. Most importantly, the book also correlates the structural activity relationship and the related biological activity of the sulphonamides, attracting both novice and experienced chemists across the globe.
**Thiadiazoles: Advances in Research and Applications**

*Alberto Cohen*

In series: *Chemistry Research and Applications*
Publication Date: 11/20/2020
230 pp.
Hardcover: 978-1-53618-878-3. $160.00
e-book: 978-1-53618-887-5. $160.00

Thiadiazoles: Advances in Research and Applications opens by discussing how, due to antioxidant properties, influence on muscarinic acetylcholine receptors, and inhibition of acetylcholinesterase activity, 1,2,4-thiadiazole-class compounds can be considered as potential drugs in the treatment of disorders connected with the central nervous system, such as Alzheimer’s disease.

An overall review of the synthesis, biological activity, solubility, lipophilicity, and membrane permeability of a number of 1,2,4-thiadiazole derivatives with different substituents in the structure is presented.

Additionally, the authors provide an overview of the applications of thiadiazoles in the corrosion inhibition of metals and alloys. A detailed review of the literature on thiadiazole derivatives as corrosion inhibitors for acidic and neutral environments for different metallic substrates is also provided.

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**Glass Transition of Green Polymers**

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In series: *Polymer Science and Technology*
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335 pp.
Hardcover: 978-1-53619-214-8. $230.00
e-book: 978-1-53619-287-2. $230.00

In nature, green polymers (natural polymers) in plants and animals always coexist with water. The characteristic features of polymers organized in nature are difficult to understand without water. Specific features of green polymers are characterised via interaction with water molecules which strongly interact with the hydrophilic group of polymers. Molecular motion of the main chain of polysaccharides, whether extracted from wood, fungi, seaweed, or bacteria, is considerably enhanced in the presence of water. Not only in crystalline polysaccharides but also amorphous lignin, the effect of water on molecular motion is clearly observed by various experimental techniques. When the molecular motion of green polymers is investigated in the presence of water, molecular rearrangement occurs by the introduction of water into the system, and the higher-order structure is rearranged during molecular movement by heating conditions. Phase transition behaviour of water molecules is also affected in the presence of hydrophilic polymers, such as polysaccharides. Molecular enhancement of water molecules and hydrophilic polymers cooperate with each other and phase transition behaviour of the above system also corresponds to the above motion. Even the first-order phase transition of water is affected in the presence of polysaccharides. When glass transition behaviour of the natural polymer-water system is investigated, it is important to take into consideration the fact that the structural change of both components has necessarily taken place.

In this book, the molecular relaxation of green polymers, especially the thermodynamic concept of green polymers and the bound water, will be described in Chapter 2. Various techniques to measure the glass transition of green polymers in dry and wet conditions are explained in Chapter 3. Special attention is paid to sample handling for controlling water content. Glass transition behaviour of various polysaccharides and model compounds is described in Chapter 4. An explanation of lignin and its synthetic model polymers is also given in Chapter 5.
What to Know about Lignin

María González Alriols (University of the Basque Country, UPV/EHU, Chemical and Environmental Engineering Department, Spain), Dr. Jalel Labidi (University of the Basque Country, UPV/EHU, Chemical and Environmental Engineering Department, Spain) and M. Özgür Seydibeyoğlu (Izmir Katip Celebi University, Materials Science and Engineering, Izmir, Turkey)

In series: Polymer Science and Technology

Publication Date: 02/24/2021

340 pp.

Hardcover: 978-1-53619-152-3, $230.00

e-book: 978-1-53619-222-3, $230.00

This book presents recent developments about lignin documented with world renown researchers. The book is divided into 3 parts:

a) Lignin Extraction/Characterization
b) Lignin Modification
c) Lignin Applications

Lignin chemistry is still a mysterious area with various lignin types from various plants in the world providing us new opportunities to discover new materials. With the world extensive knowledge on surface chemistry, there are various methods to modify lignin structure. There are also many applications in polymeric resins, polymer composites, fertilizers and enhanced oil recovery. The book covers all the important developments about this highly important material group “Lignin”.

Special Topics

A Comprehensive Guide to Natural Products

Silje A. Dahl and Adam M. Frandsen

In series: Chemistry Research and Applications

Publication Date: 09/18/2020

206 pp.

Softcover: 978-1-53618-418-1, $95.00

e-book: 978-1-53618-432-7, $95.00

In this compilation, the role of liquid chromatography, mass spectrometry and chemometrics for the analysis and characterization of plant natural products is addressed.

The authors provide a comprehensive review of the pharmacological activity of cetrarioid lichens and their major secondary metabolites as antioxidants to prevent and treat oxidative stress-related diseases.

Following this, the way in which the detection of various secondary metabolites and bioactive compounds in some plants can reduce sickle cells in vitro is studied.

In addition, the efficiency of green and conventional solvent systems concerning the three classes of phytochemicals (phenols, alkaloids, and flavonoids) is described.

Lastly, a brief history of antibiotics and the spread of resistance is provided, and future strategies to combat drug-resistant microbes are discussed.

Advances in Chemistry Research. Volume 64

James C. Taylor

In series: Advances in Chemistry Research

Publication Date: 10/01/2020

264 pp.

Hardcover: 978-1-53618-568-3, $250.00

e-book: 978-1-53618-601-7, $250.00

Advances in Chemistry Research. Volume 64 first focuses on the fluorescence detection or imaging of cupric ions by synthetic fluorescent probes. Major literature reports in the field of small molecules as fluorescent sensors for the detection of Cu2+ ions since 2011 till date are discussed.

The authors provide a general overview of different types of click polymerizations and their membrane applications as high-performance polymers, with a special emphasis on
the recent developments of CuAAC click polymerizations in their laboratory in the field of proton exchange membranes. Lastly, the latest achievements and prospects for applying the CuAAC reaction in the synthesis of biologically active steroids and triterpenoids are discussed. Steroids and triterpenoids are available and promising initial materials for the CuAAC reaction due to their wide biological activity, structural diversity, and abundance in nature.

**Advances in Chemistry Research. Volume 66**

*James C. Taylor*

In series: *Advances in Chemistry Research*

Publication Date: 12/02/2020

260 pp.

Hardcover: 978-1-53618-844-8. $250.00
e-book: 978-1-53618-855-4. $250.00

Advances in Chemistry Research. Volume 66 begins with a focus on the development of reproducible and economical methodologies for the separation, identification and quantification of chemical species present in oils and greases.

The authors discuss the major structure-function attributes of azoles as antifungal mainstays, with an intensive focus on resistant mechanisms and concurrent remedial measures.

Following this, the total syntheses of biologically active natural products achieved over the past 25 years is described.

The concluding study concerns methanol, a toxic substance with a neutral, colorless liquid and a mild odor.

**An Introduction to Electronic Structure Theory**

*Nadia T. Paulsen*

In series: *Chemistry Research and Applications*

Publication Date: 09/18/2020

197 pp.

Softcover: 978-1-53618-411-2. $95.00
e-book: 978-1-53618-477-8. $95.00

In An Introduction to Electronic Structure Theory, Quantum Information Theory is applied to donor-acceptor systems. Reaction stages and charge-transfer phenomena are described, continuities of probability and phase distributions are explored, and resultant information descriptors combining classical and nonclassical contributions are summarized.

The authors describe the most efficient method for studying the electronic structure of solids, the magnetic dilution method, or the study of the magnetic susceptibility of diluted solid solutions of paramagnetic oxides in diamagnetic isomorphous matrices.

A review of the mathematical modeling and investigation of the electronic structure of some nanomaterials, composite materials, and graphene is presented using the Parameterized Model number 3 (PM3) semi-empirical method.

A basic introduction of electronic structure theory with commonly used notation is provided, as well as its applications for studying the physical properties of materials.

Lastly, based on a concept of “different prescription for different correlation”, a multireference Brillouin-Wigner perturbation scheme with improved virtual orbitals is presented as an accurate and affordable computational protocol for treating electronic states plagued by quasidegeneracy.

**Properties and Uses of Butanol**

*Arnaud M. Artois*

In series: *Chemistry Research and Applications*

Publication Date: 10/30/2020

166 pp.

Softcover: 978-1-53618-448-8. $95.00
e-book: 978-1-53618-544-7. $95.00

Properties and Uses of Butanol reviews the different types of butanol along with its characteristics, methods of production and future trends observed in its applications as an alternative energy resource.

The main aspects involved in the production of biobutanol are described, including raw materials, the transformation of biomass and the separation of the acetone-butanol-ethanol mixture. The most important areas of opportunity are determined, focusing on the enhancements required by the production process to increase reaction yields in the hydrolysis and fermentation steps.
The closing study discusses the oxidation of butanol on Pt single crystal, the possible mechanisms of the butanol oxidation reaction, and the working principles of fuel cells.

Spectrum of Isothiocyanate Chemistry and its Applications

Surinder Kumar Mehta (Professor, Department of Chemistry & Centre of Advanced Studies in Chemistry, Panjab University, Chandigarh, India) and Shweta Sharma (Chairperson, Institute of Forensic Science and Criminology, Panjab University, Chandigarh, India)

In series: Chemistry Research and Applications

Publication Date: 01/05/2021

374 pp.

Hardcover: 978-1-53616-478-7, $230.00
e-book: 978-1-53619-005-2, $230.00

This book is a compilation of invaluable contributions in the field of isothiocyanate chemistry. It clearly presents multidisciplinary chapters which focus on the various applications of isothiocyanates in the fields of health, fitness, and environmental sciences. Isothiocyanates are a class of agents that can simultaneously deliver diagnostic and therapeutic functions, enabling the detection and treatment of diseases in a single procedure, and play an efficient role in fighting against the global problem of pollution.

COMPUTER SCIENCE AND INTERNET

Artificial Intelligence

Artificial Intelligence Driven By Machine Learning And Deep Learning

Bahman Zohuri and Siamak Zadeh (Golden Gate University, San Francisco, CA, US)

In series: Computer Science, Technology and Applications

Publication Date: 10/09/2020

455 pp.

Hardcover: 978-1-53618-314-6, $270.00
e-book: 978-1-53618-367-2, $270.00

The future of any business from banking, e-commerce, real estate, homeland security, healthcare, marketing, the stock market, manufacturing, education, retail to government organizations depends on the data and analytics capabilities that are built and scaled. The speed of change in technology in recent years has been a real challenge for all businesses. To manage that, a significant number of organizations are exploring the BigData (BD) infrastructure that helps them to take advantage of new opportunities while saving costs. Timely transformation of information is also critical for the survivability of an organization. Having the right information at the right time will enhance not only the knowledge of stakeholders within an organization but also providing them with a tool to make the right decision at the right moment. It is no longer enough to rely on a sampling of information about the organizations' customers. The decision-makers need to get vital insights into the customers' actual behavior, which requires enormous volumes of data to be processed. We believe that Big Data infrastructure is the key to successful Artificial Intelligence (AI) deployments and accurate, unbiased real-time insights. Big data solutions have a direct impact and changing the way the organization needs to work with help from AI and its components ML and DL. In this article, we discuss these topics.
Computer Science

A Comprehensive Guide to Neural Network Modeling
Steffen Skaar
In series: Computer Science, Technology and Applications
Publication Date: 09/18/2020
172 pp.
Softcover: 978-1-53618-466-2. $95.00
e-book: 978-1-53618-542-3. $95.00
As artificial neural networks have been gaining importance in the field of engineering, this compilation aims to review the scientific literature regarding the use of artificial neural networks for the modelling and optimization of food drying processes. The applications of artificial neural networks in food engineering are presented, particularly focusing on control, monitoring and modeling of industrial food processes. The authors emphasize the main achievements of artificial neural network modeling in recent years in the field of quantitative structure–activity relationships and quantitative structure–retention relationships.
In the closing study, artificial intelligence techniques are applied to river water quality data and artificial intelligence models are developed in an effort to contribute to the reduction of the cost of future on-line measurement stations.

Anomaly Detection: Techniques and Applications
Dr. Saira Banu (Professor, Department of Computer Science and Engineering Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India), Dr. Shriram Raghunathan (Program Chair, Gaming, VIT, Bhopal, India), Dr. Dinesh Mavaluru (Assistant Professor, Department of Information Technology, College of Computing and Informatics, Saudi Electronic University, Saudi Arabia) and Dr. A. Syed Mustafa (Professor and Head, Department of Information Science and Engineering, HKBK College of Engineering, Bangalore, Affiliated to Visvesvaraya Technological University, India)
In series: Computer Science, Technology and Applications
Publication Date: 03/11/2021
177 pp.
Softcover: 978-1-53619-264-3. $95.00
e-book: 978-1-53619-355-8. $95.00
When information in the data warehouse is processed, it follows a definite pattern. An unexpected deviation in the data pattern from the usual behavior is called an anomaly. The anomaly in the data is also referred to as noise, outlier, spammer, deviations, novelties and exceptions. Identification of the rare items, events, observations, patterns which raise suspension by differing significantly from the majority of data is called anomaly detection.
With progress in the technologies and the widespread use of data for the purpose for business the increase in the spams faced by the individuals and the companies are increasing day by day. This noisy data has boomed as a major problem in various areas such as Internet of Things, web service, Machine Learning, Artificial Intelligence, Deep learning, Image Processing, Cloud Computing, Audio processing, Video Processing, VoIP, Data Science, Wireless Sensor etc. Identifying the anomaly data and filtering them before processing is a major challenge for the data analyst. This anomaly is unavoidable in all areas of research. This book covers the techniques and algorithms for detecting the deviated data. This book will mainly target researchers and higher graduate learners in computer science and data science.
Computers in Education: Trends, Applications and Challenges
Ganelon Metivier
In series: Computer Science, Technology and Applications
Publication Date: 10/23/2020
119 pp.
Softcover: 978-1-53618-612-3. $82.00
e-book: 978-1-53618-673-4. $82.00
Computers in Education: Trends, Applications and Challenges summarizes various reactions to school closure due to COVID-19, particularly focusing on the digitalization of education, government, schools, and the private sector. The authors aim to demonstrate connections that exist between the notion of technology and education. The theory has been used by educational researchers to design user interface and mobile learning applications. The development, implementation and evaluation of a mixed-mode delivery method involving a well-designed user interface and mobile learning applications is discussed. The concluding study presents some implementations of Newton-Cotes integration methods to nonlinear 2D integrals with a new calculator: TWOD_integral_calculator designed with the help of Matlab Graphical User Interface.

Frontiers in Quantum Computing
Luigi Maximilian Caligiuri (Professor of Physics at Italian Minister of Education, University and Scientific Research (MIUR) and General Director at Foundation of Physics Research Center (FoPRC) Foundation of Physics Research Center (FoPRC), Cosenza, Italy)
In series: Physics Research and Technology
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428 pp.
Hardcover: 978-1-53618-515-7. $230.00
e-book: 978-1-53618-657-4. $230.00
Quantum Computing is an ever-increasing field of interest both from a conceptual and applied standpoint. Quantum Computing, belonging to the so-called “Quantum Information Science”, is founded on the principles of Quantum Mechanics and Information Science. Quantum Mechanics has radically changed our vision and understanding of the physical reality and has had also an enormous technological and societal impact. On the other hand, the developing of Information Theory, including computer science and communications theory, made possible the information “revolution” which had a deep impact on our everyday life. Quantum Computing then relates to the possibility to represent, process and manipulate information by using the principles of quantum mechanics. Apart from the theoretical importance of quantum computing to further understand the quantum mechanical behavior of physical systems and the physical foundation of information itself at the most elementary level, probably the most interesting feature of Quantum Computing is related to the possibility to design and realize an actual quantum computer which processes information in the form of quantum-bits or qubits. The great interest of scientific community in the realization of such devices mainly concerns the common belief they could be enormously faster than their classical counterparts so allowing their employment in all the applied fields where computational power is a key feature. Furthermore, the study of Quantum Computing, both at the physical and computational level, would be very important for a deeper understanding of the quantum behavior of a very wide range of physical systems including condensed matter, living systems, elementary particles, astrophysical structures and so on. Despite the general theoretical basis of quantum computing are sufficiently understood, the actual realization of a general-purpose and really usable quantum computer has posed great difficulties so far, mainly related to the issue of “quantum decoherence”, the computational speed and scalability many of which still remain substantially unsolved. This volume doesn’t mean to represent a complete or a beginner guide to Quantum Computing but has the aim to present some of its most interesting and fascinating developments in different frontier areas related to both theoretical and applied aspects, such, for example, the possibility to realize a quantum superfast “hypercomputing” system using water molecules as physical substrate to process, storage and retrieve information; the connection between quantum computers and quantum gravity; the development of an “instantaneous quantum computer algorithm”; the realization of a universal quantum computer, of a brain-like quantum supercomputer and many others frontiers topics. The target audience of this book is then composed of scientists and researchers interested in the most advanced theoretical and applied developments of quantum computation and quantum information.
Horizons in Computer Science Research. Volume 20
Thomas S. Clary
In series: Horizons in Computer Science
Publication Date: 02/10/2021
229 pp.
Hardcover: 978-1-53619-103-5, $250.00
e-book: 978-1-53619-107-3, $250.00
This compilation opens with a review of the applications of several anomaly-based methods under the computational intelligence umbrella for the detection of DDoS attacks.
Following this, a study is carried out to reveal the effects of a device developed to enable visually-impaired people to read any document in the Braille alphabet.
The performance of the Artificial Bee Colony (ABC) algorithm on CEC2010 benchmark problems is also studied, with the goal of increasing the performance of the algorithm changes presented in large-scale optimization problems.
Later, the opportunities and limitations of present waste management techniques are highlighted, and some future research proposals are discussed.
The authors provide an overview of the field of motion capture focusing on methods, systems, and applications. More information about the motion processing and motion reconstruction technologies applied in the most prevalent optical and inertial systems is presented.
In closing, a partially-manual method for using images to measure body poses is presented and discussed.

Support-Vector Machines: Evolution and Applications
Pooja Saigal (Associate Professor, Vivekananda School of Information Technology, Vivekananda Institute of Professional Studies, (Affiliated to Guru Gobind Singh Indraprastha University), New Delhi, India)
In series: Computer Science, Technology and Applications
Publication Date: 12/10/2020
245 pp.
Hardcover: 978-1-53618-757-1, $160.00
e-book: 978-1-53618-865-3, $160.00
Support Vector Machines: Evolution and Applications reviews the basics of Support Vector Machines (SVM), their evolution and applications in diverse fields. SVM is an efficient supervised learning approach popularly used for pattern recognition, medical image classification, face recognition and various other applications. In the last 25 years, a lot of research has been carried out to extend the use of SVM to a variety of domains. This book is an attempt to present the description of a conventional SVM, along with discussion of its different versions and recent application areas.
The first chapter of this book introduces SVM and presents the optimization problems for a conventional SVM. Another chapter discusses the journey of SVM over a period of more than two decades. SVM is proposed as a separating hyperplane classifier that partitions the data belonging to two classes. Later on, various versions of SVM are proposed that obtain two hyperplanes instead of one. A few of these variants of SVM are discussed in this book.
The major part of this book discusses some interesting applications of SVM in areas like quantitative diagnosis of rotor vibration process faults through power spectrum entropy-based SVM, hardware architectures of SVM applied in pattern recognition systems, speaker recognition using SVM, classification of iron ore in mines and simultaneous prediction of the density and viscosity for the ternary system water–ethanol–ethylene glycol ionic liquids.
The latter part of the book is dedicated to various approaches for the extension of SVM and similar classifiers to a multi-category framework, so that they can be used for the classification of data with more than two classes.
Top 10 Challenges of Big Data Analytics

Maria José Sousa, PhD (Assistant Professor, School of Sociology and Public Policy Instituto Universitário de Lisboa, Business Research Unit, Lisboa, Portugal) and  Manuel Au-Yong Oliveira, PhD (Assistant Professor, Aveiro University, Portugal)

In series: Research Methodology and Data Analysis
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206 pp.
Hardcover: 978-1-53619-133-2, $160.00
e-book: 978-1-53619-189-9, $160.00

The application of big data analytics in all fields of research is a critical driver for the competitiveness of all countries in the modern world. Currently, governments and industry generate large amounts of data driven by record keeping, compliance, regulations, data privacy, and dynamic requirements, and thus there is a need to create better mechanisms to analyse data, and hence support organizational development, as well as providing aid to policymakers’ decision-making processes. In this context, there are emerging disruptive opportunities because of Big Data: new business models, and vertical industry segments will emerge through shared relationships with all the stakeholders, and big data analytics is a major asset to support these dynamic relationships. This book was developed with the objective of analysing some of those challenges while at the same time providing a perspective of the potential of big data analytics, and the importance that analytics have for managers and for policymakers, to help define new strategies and new public policies, respectively. The book is focused on different sectors of activity (i.e. the Health sector, Public Administration, the Education sector, among others), and on different economic dimensions (i.e. Entrepreneurship, and Innovation) and links big data analytics to different fields of research, such as artificial intelligence and other emergent technologies; which are challenging organisations, governments, and societies, with the need to face the new imperative of being prepared for the very uncertain and tremendously complex future – in which big data analytics will play a very decisive and active role.

Special Topics

An Introduction to Approaches and Modern Applications with Ensemble Learning

Yi-Tung Chan, PhD (Department of Electrical Engineering, R. O. C. Naval Academy, Kaohsiung, Taiwan)

In series: Computer Science, Technology and Applications
Publication Date: 11/20/2020
335 pp.
Hardcover: 978-1-53618-680-2, $230.00
e-book: 978-1-53618-846-2, $230.00

From the successful application of deep learning (DL) in AlphaGo in 2012 to the recent advances in edge computing, artificial intelligence (AI) has continued to develop over the years. In the face of the current sweeping trend of AI, ensemble learning (EL) is expected to be further applied to DL and AI for developing higher-level ensemble systems in the future. Moreover, it could become an important step for achieving “The Master Algorithm” proposed by Prof. Pedro Domingos. In light of this, EL will continue to make a significant contribution to future development. The purpose of this book is to provide insights into EL for readers not majoring in computer science or related subjects, introduce the latest development and applications of EL; in particular, share its practical applications in various fields. Accordingly, this book intends to present theoretical parts relating to mathematics and computing in a simple and concise manner. The examples and practical use of EL have been used to explain methods that utilize EL to solve readers’ issues in their fields, which demonstrates the essence of EL for practical applications. While many AI and ML books are available on the market, most require a certain level of mathematical and machine learning (ML) knowledge. Complicated theories of mathematics and computation may be intimidating for people without a background in computer science and engineering, such as biological and medical researchers. It would be unfortunate if they were to miss the opportunity to use EL as a practical tool to solve data analysis problems at hand. Moreover, EL is usually introduced in the later or advanced chapters of AI and ML books. Beginners in ML, or readers without a technical background, are likely to be frustrated by mathematical or technical terms that only appear occasionally in the book or be anxious about complicated mathematical and computational theories related to classification algorithms. It would be regrettable if they were intimidated, and therefore, missed the opportunity to learn and use EL. From a practical perspective, existing classification techniques, such as decision trees with the C4.5 algorithm, support vector machines, and neural networks are now relatively mature and have been proven to be effective. For readers
without a technical background, it is not essential to understand the complicated mathematical and computational theories behind the above techniques. Instead, it is recommended to grasp the logic and meaning of parameters in these classification algorithms and directly conduct tests using EL. Learning through practice can help readers to establish computational thinking. It is the best approach to learning EL, ML, AI, and DL.

Furthermore, this book provides references and recommended reading for each technique to satisfy the curiosity of some readers with regard to mathematical theories and algorithms so that they can acquire further knowledge and answer their questions. Finally, the hope is that readers can be made aware, through practical use of EL, that they can build a robust ensemble system and solve problems in their areas without having to learn the absolute details of specific ML algorithms and mathematics behind the algorithms.

This book provides insights into EL from worldwide experts and scholars in various fields. This book extensively introduces and discusses the application of EL in various fields and the current and future research directions of its novel applications. It also reviews some of the more popular areas in which EL has received widespread attention in recent years in the ML and AI. Each chapter opens with an introduction to ML and EL techniques, and then, analyzes the applications of EL in different fields, such as signal and image processing, medical care, education, geology, and agriculture. More than two experts and scholars in related fields acted as reviewers for the peer review of each chapter. It is hoped that these applications in various fields can inspire readers to use EL in practice.

Computing Ethics

Abdelrahman Karrar (Associate Professor, Information Systems Department, College of Computer Science & Engineering, Taibah University, Kingdom of Saudi Arabia) and Kamal Dahbur (Professor, Information Systems Department, College of Computer Science & Engineering, Taibah University, Kingdom of Saudi Arabia)

In series: Ethical Issues in the 21st Century
Publication Date: 03/11/2021
149 pp.
Softcover: 978-1-53619-378-7, $95.00
e-book: 978-1-53619-401-2, $95.00

Ethics is an important basis for controlling and regulating human behavior in all areas of life, including but not limited to dealing with other people at work. This book covers ethical issues related to the field of information technology and computing, and discusses some of the ethical issues from the perspective of the Arabic and Islamic cultures. The book concentrates on understanding the legal, ethical, and societal issues related to the field of information technology and computing without indulging into the implications of these issues on other fields, such as music or painting copyrights. The book is well suited for undergraduate and graduate students in colleges and universities in the Middle East and Islamic world. The book also provides an excellent foundation in ethical, legal and cultural decision-making for current and future professionals, practitioners and managers in the field of computer science and information technology.

The book covers many fundamental and contemporary topics, including:

- Ethical theories, philosophy, responsibility and code of ethics
- History of computing ethics and ethics for the computing professions
- Professional ethics in Islam
- Negative uses of computers and the Internet
- Privacy, anonymity and position of Islam on privacy
- Ethical issues related to software piracy and intellectual property
- Supporting and opposing Islamic views on intellectual copyright
- Ethical Issues related to globalization
- Ethicality of threats and violation to information security
- Hackers, vandals, spyware and network security risks
Toward this end, developing an efficient congestion control mechanism is regarded as a key to an efficient and robust network design since the network availability and stability can directly affect the network performance, in terms of interoperability and robustness, especially in the case of an explosive increase in the network traffic volume. In particular, when a network link becomes corrupted or overload, congestion may occur due to packet drops. As a result, the overall network performance, including network throughput, latency, and response time will be degraded. The book is not intended to provide a comprehensive description of various congestion control techniques. Rather, with the assumptions that the readers have some general knowledge of networking fundamentals, the main goal of this book is to bring together distinguished perspectives of congestion control in different network platforms and technologies, ranging from TCP/IP, MPTCP (Multipath TCP) in heterogeneous networks, wireless networks to information-centric networks as future networks, and even supercomputing. The book then aims to give a new insight into this challenging and important topic of congestion control to overcome network performance degradation when congestion occurs from both theory/principles and practical viewpoints. Hence, we hope that this book provides a broader picture of the Congestion control concept in the context of communication networks toward efficient network design.
and increase returns on investments. IoT has the potential to transform the way consumers and businesses approach the world by leveraging the scope of IoT beyond connectivity. Economies are constantly “falling out” in every industry, but to be truly disruptive, an economy must entirely transform a product or solution that was so complicated historically that only a few affluent people who carry certain skills had access to it. A disruptive economy is often a much simpler, low-grade solution that’s more affordable and accessible to a large percentage of the population, thus opening it to an entirely fresh market. This often upends established industries and overthrows existing market leaders.

Internet of Things and Businesses in a Disruptive Economy provides insight on how the newly emerging IoT will provide unprecedented opportunities to permeate technology and automation into everything we do, while at the same time providing a huge playing field for businesses to develop state-of-the-art business models to capture market shares. This book covers business domains like human resource management, health care, agriculture, smart cities projects, smart manufacturing, smart education, cloud computing, and IoT securities issues.

Readers will gain a broad understanding of IoT wherever IoT is applicable, as well as the role IoT plays in transforming business processes and ensuring sustainable growth in the disruptive economic environment. Readers will be able to use IoT to tackle real-world problems ranging from those in the manufacturing sector, human resource management, health care, agriculture, surveillances systems, cloud computing and smart cities and various other domains of business.

**The Fundamentals of Search Algorithms**

*Robert A. Bohm*

In series: *Computer Science, Technology and Applications*

Publication Date: 02/15/2021

101 pp.

Softcover: 978-1-53619-007-6. $82.00
e-book: 978-1-53619-246-9. $82.00

Heuristic local search algorithms are used to find “good” solutions to the NP-hard combinatorial optimization problems that cannot be solved using analytical methods. Chapter one discusses the characterization and computation of heuristic local search algorithm for the Traveling Salesman Problem (TSP) from the perspective of dynamical systems.

The purpose of chapter 2 is to show the practical application of CBIR technology in the security and protection of personal data, access to classified documents and objects, identification of illegal attacks that are part of the social life of the present and future of mankind.

Continuous search space problems are difficult problems to solve because the number of solutions is infinite. Moreover, the search space gets more complex as we add constraints to the problem. In this context, chapter 3 aims to show the usage of the differential evolution algorithm for solving continuous search space problems using unconstrained functions and a constrained real-world problem.

**Wireless Sensor Networks (WSN): Technology and Applications**

*Abdulrahman Yarali (Professor and Coordinator, Cybersecurity Network Management, Professor of Telecommunications Systems, Murray State University, Murray, KY, USA)*

In series: *Computer Science, Technology and Applications*

Publication Date: 10/16/2020

386 pp.

Hardcover: 978-1-53618-726-7. $230.00
e-book: 978-1-53618-779-3. $230.00

The current world of technology faces massive advancements that influence different sectors such as transport, health care system, and education, amongst others. The telecommunication and information industry has become significant over time and has experienced considerable development. This trend is likely to extend into the future, both in terms of hardware and software. The industry plans to make modern advancements in the next five years to change their current modes of operation. Some of the significant changes that are forecast for the industry include technological advances such as 5G, Artificial Intelligence (AI), Machine Learning (ML), IoT, wireless sensor networks, and cross-industry alliances. 5G mobile connectivity is expected to bring advanced technical improvements helping employment as well as growth in GDP.

In the fusion of these technologies, the potential of IoT and Wireless Sensor Networks (WSN) would be witnessed through various applications such as connected consumer, home monitoring system, predictive maintenance, factory monitoring, and so on. A Wireless Sensor Network (WSN) is a term used for a network of devices that can gather information and then communicate it through any wireless link. The data collected is then transferred using different nodes and multiple gateways. With the evolution of technology, some new criteria have been introduced to check and balance the environmental conditions for reliable and fast response operations for a quick response and service under different
scenarios and situations. There has been an increased use of smart wireless sensor objects in the current world by various organizations. The growth of the Internet of Things (IoT), industrial IoT, and wireless sensor networks have shaped different technologies and enables faster, reliable, and sufficient production of goods and services. Although there are limitations and challenges such as storage capacity, processing power, communication range, and battery life, WSN significantly affects IoT technology development. Learning about the standards and specifications of WSNs is vital to understanding their general functionality and how they are in close interaction with the Internet of Things, with many massive billions of device connectivity. Future developments should focus on building a self-adaptive spectrum management middleware for the wireless sensor networks. The telecom industry will continue to face regulatory challenges it faces currently. Various new regulations are likely to come up soon, and these will also have financial implications for the companies. The need to ensure consumer privacy is a critical issue that will be of prime concern to the telecoms in the next few years. Various aspects, such as the standards and the architectures, need to be considered to ensure the security and operational consistency of these wireless sensor networks; therefore, industry players should keep up with the changing trends and adapt accordingly.

In this book there are twelve chapters which cover wireless networking sensors evolution and technologies advancement. We are very pleased that the technology, academic, and industry communities are discussing this important and fast growing industry and we are certain that the content of this book will shed some light on this subject. The chapters presented in this book discuss technologies, design, implementation and applications of various short and long range wireless sensors networking. The challenges and issues faced in providing applications and services to meet user experiences ubiquitously and securely are presented.

Earth Sciences

Atmospheric Sciences

Walking the Science’s Narrow Path: Zavisa Janjić
Tijana Janjic (Associate Professor, Institute of Meteorology, Ludwig-Maximilians-Universität München, Munich, Germany), Dragutin T. Mihailović (Professor in Meteorology and Environmental Fluid Mechanics, Faculty of Agriculture, Faculty of Science, Department of Physics, University of Novi Sad, Serbia) and Slobodan Nickovic (Research Advisor, Republic Hydrometeorological Service of Serbia, Belgrade, Serbia)

In series: Earth Sciences in the 21st Century
Publication Date: 02/09/2021
181 pp.
Softcover: 978-1-53618-899-8; $95.00
e-book: 978-1-53619-054-0; $95.00

Zaviša Janjić may mostly be remembered for his pioneering contributions that allowed for the advancement of weather forecasting, which we witnessed over the last 40 years. In the scientific community, he is valued for his remarkable knowledge and intellect that formed the basis of his legacy of innovation, rigor and achievement in atmospheric science. His accomplishments were honored with numerous prestigious awards, and his ingenuity, brightness, kindness and humor kindled respect and dedication in his many colleagues and students. Upon Zaviša Janjić’s passing, collaborators and students endeavored to describe his person and his work by assembling the details of his journey on the narrow path to true success in science—a path that is reserved for a select few.

As a young student, Zaviša started work on his first limited area numerical weather prediction model, which became operational at the Federal Hydrometeorological Institute of the former Yugoslavia in 1978. Janjić was able to solve several difficult scientific questions during the model design and development phase, which helped lay the foundation for his models. Starting in the mid-to-late eighties, Professor Janjić worked on parameterizations of numerous physical processes. This work developed over the longest portion of his career, lasting more than 20 years. It included the development ofEta, Weather Research and Forecasting Nonhydrostatic Mesoscale Model (WRF-NMM) and Non-hydrostatic Meso-scale Model on B grid (NMMB), which were National Centers for Environmental Prediction (NCEP) weather prediction models. Readers of this book will also enjoy a reprint of an interview with Professor Janjić; a professional biography with Professor Janjić’s specific contributions and references to scientific papers; commemorative letters from several directors of major meteorological centers describing how they saw Professor Janjić’s work in atmospheric science; and photos and documents from Janjić’s life and work.

Interlacing his life story with a working biography, writers and editors of this book hope to inspire the coming generation of scientists, as well as provide a timely tribute to Professor Janjić’s contribution to atmospheric science.
Wind Speed: An Overview
Nicolas Koči
In series: Meteorology and Climatology
Publication Date: 09/18/2020
142 pp.
Softcover: 978-1-53618-412-9. $82.00
e-book: 978-1-53618-487-7. $82.00
In Wind Speed: An Overview, the history and development of wind energy is reviewed. Scientific trends in the academic field of wind energy are determined using a scientometric network analysis.
The relationship between wind speed forecasting and wind disasters is evaluated, particularly focusing on extra-tropical and tropical cyclones due to their dynamic origins.
Wind energy plays a significant role in clean energy sources, and the amount of energy that can be produced from a wind turbine is directly related to the value of the wind speed in that specific location.
The closing study focuses on wind as a source of energy in Kitka and Koznica, maintaining that in order to harness wind energy, it is necessary to carry out terrain condition analyses for the installation of wind turbines.

Geology

A Focus on Mining
Henri Walker
In series: Geology and Mineralogy Research Developments
Publication Date: 01/27/2021
400 pp.
Hardcover: 978-1-53619-037-3. $230.00
e-book: 978-1-53619-164-6. $230.00
The processes and requirements to mine on federal lands vary by mineral category, surface/subsurface management agencies, and estate ownership. Chapter 1 offers an introduction to the framework created by federal statutes applicable to mining on federal lands. It also highlights some topics in the mining sector that may be relevant to the issue of mining on federal lands.

Geophysics

Seismology
Bogdan Felix Apostol
In series:
Publication Date: 09/02/2020
345 pp.
Hardcover: 978-1-53618-492-1. $230.00
e-book: 978-1-53618-559-1. $230.00
The book offers a comprehensive physical theory of the earthquakes. The presentation level is rather mathematical, but thorough physical explanations are provided everywhere.
We do not know where and when and how great an earthquake occurs. The seismic events have a statistical character. Statistical Seismology is discussed extensively in this book, centered on the famous Gutenberg-Richter, Omori and Bath statistical laws. The earthquakes may be correlated, foreshocks may herald a main shock, aftershocks may follow a main shock. The pattern of such correlations, their extension in time and magnitude are discussed in this book.
The earthquakes are produced by forces acting for a short time in a localized focal region placed inside the Earth. These forces give rise to elastic deformations and elastic waves, which arrive at Earth’s surface as earthquakes. The nature of these forces and their effects are discussed in this book. Any earthquake begins by a
feeble tremor, the so-called P and S seismic waves, followed by a large, main shock, which looks like a wall with a long tail. This book explains why it is so. We cannot predict the occurrence of the earthquakes. But we can know something about them. For instance, there exist seismographs, a sort of pendulums, which record the ground displacement. There exist agencies which tell us the earthquake magnitude, its energy, location, fault slip, by reading the seismograms. We may wish to get such information by ourselves, almost in real time, knowing the seismograph recordings, to be independent of the seismological agencies. This book teaches us how to do that.

The book describes the accumulation of the seismic energy in the focal region, its release, the shape and strength of the ground displacement. It is shown that the seismic faults may give rise to rather complicated tensorial forces, which account both for the static deformations of the Earth’s surface and for the seismic waves produced in an earthquake. A model of energy accumulation in the earthquake focus is formulated and used to derive the statistical Gutenberg-Richter laws. These laws are used to analyze the statistics of the seismic events in Vrancea, Romania, as an example. A special emphasis is given to the short-term seismic activity. The book introduces the point tensorial force of the seismic faults and employs it to present both the static deformation of the Earth’s crust in epicentral regions and the seismic waves and the main shock which appear on any typical seismogram. This later point is the solution of the so-called Lamb seismological problem. The book describes the determination of the seismic-moment tensor, earthquake magnitude, the volume of the focal region, the duration of the seismic activity in the focus, the fault orientation and the fault slip from measurements of the seismic waves at the Earth’s surface. This is the solution of the inverse seismological problem. A special point is a qualitative estimation of these parameters which can be practised by everyone in real time.

The book presents the vibrations of the Earth viewed as a solid sphere and the vibrations of an elastic half-space. The static deformations of the elastic half-space under the action of point forces are also included. Finally, earthquake correlations, Bath’s law and earthquake entropy are discussed.

The book is an original monograph of Seismology, intended for the use of the students, researchers and the public who wish to become familiar with the physics and mathematics of the earthquakes. It provides the understanding of the earthquakes and specific knowledge we may have of them.
Lake ecosystems are known to be valid sentinels for current climate changes and anthropogenic pressure because they provide indicators of these impacts either directly or indirectly through the influence of climate and human activity on their catchments. Among these indicators, to name just a few, are water temperature, dissolved organic carbon, nutrients and metals, phyto- and zooplankton composition as well as population and biodiversity of crustacea, mollusks and fish. The advantages of using lakes as tracers of climatic changes and anthropogenic impacts on aquatic ecosystems are multiple. Lake ecosystems are well constrained, confined and are studied in a sustained fashion; lakes respond directly to climate change and local and global pollution via incorporating the effects of these impacts occurring within the catchment; lakes integrate responses over time, and thus allow to avoid the random or unique single-time effects. Finally lakes of various sizes are distributed worldwide and, as such, can act as sentinels across various climatic conditions while exhibiting different degree of vulnerability to external pressure depending on their size and specific location capturing different aspects of climate change (e.g., changing precipitation regime, heat waves, permafrost thaw, invasion of new species, local and global (dispersed) pollution).

However, the majority of published studies on lakes in the boreal and subarctic zone deal with Western and Northern Europe and Northern America, with quite limited information on lakes in the NW Russia. This book is intended to partially fill this gap by presenting 13 chapters describing the hydrology, hydrochemistry and hydrobiology of various lakes located in the NW European Russia, from the Finland border in the west to the Ural Mountains in the East. The thirteen chapters of the book, written by the experts in the field of biogeochemistry, limnology and zoology cover full limnetic ecosystems, from lake physical characteristics to lake water chemistry, microbiology, phytoplankton and zooplankton population, Crustacea, mollusks and fish. A multidisciplinary approach across wide geographical zones, comprising both small and large lakes of the Russian Subarctic, presented in this book, will be interesting for a large community of scholars, students, and researchers from academic and private organizations.

Mineralogy

Hardrock Mining: Expenditures, Leasing and Government Policy
Samuel Allen
In series: Geology and Mineralogy Research Developments
Publication Date: 12/02/2020
397 pp.
Hardcover: 978-1-53619-275-9. $230.00
e-book: 978-1-53619-304-6. $230.00
The General Mining Act of 1872 allowed individuals to obtain exclusive rights to valuable hardrock mineral deposits on land belonging to the United States. Miners explored, mined, and processed valuable minerals, but many did not reclaim the land after their operations ended. Unsecured mine tunnels, toxic waste piles, and other hazards—known as mine features—are found at abandoned hardrock mines across federal and nonfederal lands. The Forest Service, BLM, National Park Service, EPA, and OSMRE—as well as state agencies—administer programs that identify and address hazardous features at abandoned hardrock mines. This book looks at hardrock mining issues.

Minerals and Their Properties: Novel Approach for Applications
Dr. S. J. Dhoble (Department of Physics, R.T.M. Nagpur, University, Nagpur, India), Dr. Anup P. Bhat (Department of Electronics, Amolakchand Mahavidyalaya, Yavatmal, India), Dr. Renu Nayar (Department of Chemistry, D. P. Vipra College, Bilaspur, India) and Dr. Bandana Samant (Department of Geology, R.T.M. Nagpur, University, Nagpur, India)
In series: Geology and Mineralogy Research Developments
Publication Date: 12/22/2020
340 pp.
Hardcover: 978-1-53618-889-9. $230.00
e-book: 978-1-53618-990-2. $230.00
Geology deals with the Earth’s dynamics, rocks, minerals, past life, and landforms. To understand geological processes and their applications in society, a multidisciplinary approach is needed. This book discusses how minerals and their inherent properties can be used for the benefit of society.
Minerals are the building blocks of rocks and soils, and more than 3,000 varieties of minerals have been identified. Mineral science, traditionally known as mineralogy, is the study of naturally occurring solid substances in the universe. These substances were formed by complex earth system processes and provide a key to understanding the composition and origins of the earth. These minerals are classified based on their physical and chemical characteristics, occurrence, and economic value. Globally, India is considered a potential resource for various mineral deposits. According to the Ministry of Mines, the Indian subcontinent produces as many as 95 minerals. These minerals are used in numerous industries like engineering, infrastructure, electronics, armory, and food, etc. The physical properties of a mineral are characterized by the combination of crystal structure and chemical composition. To date, the chemical and physical properties of some of the new minerals are not known. Similarly, it is essential to develop artificial minerals to replace naturally occurring minerals. A lot of work has gone into developing low-cost materials in large quantities, with the same chemical properties as the natural materials, so that they can be used in a cost-effective way for the benefit of society and industry. Nowadays, minerals are also increasingly used in biomedical sciences and for assessing and managing water quality, especially in the Indian context.

The feldspar group of minerals are the most abundant minerals in the Earth’s crust and constitute up to 51% of the continental crust. The weathering of minerals, especially feldspar, plays an important role in soil formation. Soil provides indispensable resources for food production and shelter. The inherent fertility of soil depends on the presence of nutrient elements, hosting or holding minerals in rocks and sediments and their bioavailability by controlled weathering processes. Agricultural productivity is correlated with geologically recent additions of fresh rock debris by processes of volcanism, glaciations, denudation and deposition and chemical weathering of feldspars. Hence, the Feldspar group of minerals are important for increasing soil fertility and productivity. Mineral-based phosphors encourage the visual recurrence transformation to develop full-shading white emanating light-transmitting diodes (LEDs). Presently, most of the focus is on the advancement of novel mineral-based LED phosphors for strong state lighting. We have proposed a few new agent groups of mineral-based LED phosphors and strong state lighting innovations for vitality and eco-accommodating lighting frameworks. Long lasting mineral-based phosphors help in future extensions. Some of the economically important minerals of India, their properties, occurrences and government mineral policies are also discussed.

Special Topics

A Closer Look at Conflict Minerals
Matias Russo
In series: Geology and Mineralogy Research Developments
Publication Date: 12/02/2020
211 pp.
Hardcover: 978-1-53618-947-6, $160.00
e-book: 978-1-53618-966-7, $160.00
The exploitation of the mining and trade of “conflict minerals”—in particular, tin, tungsten, tantalum, and gold from the eastern region of the Democratic Republic of the Congo (DRC)—has contributed to the displacement of people and severe human rights abuses. The 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) addresses, among other things, trade in conflict minerals. This book looks at the progress made since the Dodd-Frank Act went into effect.

A Comprehensive Review of Significant Geological Eras
Miko Avei
In series: Origin, Evolution and Geological History of the Earth
Publication Date: 10/02/2020
156 pp.
Softcover: 978-1-53618-225-5, $95.00
e-book: 978-1-53618-382-5, $95.00
A Comprehensive Review of Significant Geological Eras begins by exploring the nature and evolution of the lithospheric mantle beneath the North China Craton. The late Cenozoic evolution of the east Eurasian convergent margin is described through an investigation of geothermal events related to regional tectonic movements. The authors discuss how the onset of glacial conditions began in the very early Carboniferous Tournaisian Stage and continued at least until the Gzhelian, or even into the Permian Asselian Stage.
The geochemical characteristics of volcanism in the Western Magmatic Belt and Eastern Magmatic are also discussed, indicating early stages of back-arc basins during the Tremadoc. The Neoproterozoic Malani Igneous Suite, the product of mantle plume/hotspot tectonism in the Northwestern Indian shield, is also examined. Thanks to recent developments in archaeobotany and archaeozoology, the authors evaluate how the initial domestication of plants and animals unfolded during the Neolithic revolution. Lastly, the Fars cultural zone is discussed to investigate the Neolithization process in Iran.

Nova Excerpts: Earth Sciences
Dominik Lucas
In series: Nova Excerpts
Publication Date: 12/10/2020
208 pp.
Hardcover: 978-1-53619-038-0. $125.00
e-book: 978-1-53619-048-9. $125.00
Nova Excerpts: Earth Sciences is a compilation of Abstracts and Introductions from a wide variety of Earth Science books Nova has published over the years. Each excerpt includes the title of the original book where the original content was published should readers be interested in learning more. Nova Excerpts is published simultaneously in both print and digital formats.

The Rare Earths: Their Occurrence, Chemistry, and Technology
S. I. Levy
In series: Earth Sciences in the 21st Century
Publication Date: 10/09/2020
401 pp.
Hardcover: 978-1-53618-682-6. $230.00
e-book: 978-1-53618-725-0. $230.00
The mysterious group of substances to which have been given the title of “rare earths” has long been the subject of special study. The present work is intended to give a general but fairly comprehensive account of the rare earth group.

Environmental Sciences

Air Pollution and Industrial Hygiene

Ambient Combustion Ultrafine Particles and Health
Doug Brugge, PhD (Professor and Chair, Department of Public Health Sciences, University of Connecticut, Farmington, CT USA) and Christina H. Fuller, ScD (Associate Professor, Department of Population Health Sciences, Georgia State University, Atlanta, GA USA)
In series: Environmental Research Advances
Publication Date: 02/17/2021
436 pp.
Hardcover: 978-1-53618-831-8. $180.00
e-book: 978-1-53619-002-1. $180.00
This edited and peer reviewed volume contains a collection of articles from many disciplines that address the emerging issue of ambient ultrafine particles derived from combustion sources and their health effects. The authors are published experts with respect to ultrafine particles. They write about diverse aspects of the problem including epidemiology, environmental engineering, toxicology, policy, architecture and medicine. Each chapter provides a thoroughly referenced review of the respective subject matter. Written for researchers and scientists, this work is an excellent introduction for those early in their research into ultrafine particles as well as those that are well-versed and seeking to expand into new approaches to ultrafine particles. Chapters may be read singly or in combination with other chapters, depending on the reader’s interest. As a whole, the book is a broad reference source about combustion ultrafine particles and health.

Global Warming and Climate Change

**Climate Change: Energy Transition, the Caribbean and Military Readiness**  
*Carolina Parsons*  
In series: *Climate Change and its Causes, Effects and Prediction*  
Publication Date: 03/09/2021  
356 pp.  
Hardcover: 978-1-53619-331-2. $230.00  
Managing the vast energy resources, addressing the health and environmental impacts of energy production, and understanding the role of public lands in mitigating climate change are just a few of the critical issues discussed in this book.

**Climate Change: Environmental and Economic Effects**  
*Fukui Ayaka*  
In series: *Climate Change and its Causes, Effects and Prediction*  
Publication Date: 02/24/2021  
366 pp.  
Hardcover: 978-1-53619-239-1. $230.00  
e-book: 978-1-53619-254-4. $230.00  
Climate change and extreme weather events present risks to our communities and communities around the world. Experts have warned that climate change would lead to more intense storms, extended droughts, longer wildfire seasons that burn hotter and cover larger areas, greater seasonal temperature extremes, melting of glaciers and ice sheets, and rising sea level. This book discusses ways to help communities better adapt to these changes.

**Climate Change: Extreme Weather, Risks and Costs**  
*Nicolas Delgado*  
In series: *Climate Change and its Causes, Effects and Prediction*  
Publication Date: 01/27/2021  
345 pp.  
Hardcover: 978-1-53619-113-4. $230.00  
e-book: 978-1-53619-171-4. $230.00  
Chapter 1 examines the state of the science related to extreme weather events. It will provide an opportunity to examine the role of climate change and other weather and climate factors in causing and exacerbating extreme weather events, to discuss economic and other societal impacts of extreme weather, to explore the state of forecasting and prediction of extreme weather with a focus on how to communicate uncertainty, and to identify gaps in the science. Chapter 2 reports on the kinds of climate risk information standards and tools that communities need to reduce the risks and costs of climate change, including more extreme floods and wildfires.
Solving the Climate Crisis: Building, Manufacturing, Industrial and Natural Solutions

Damion D. Berger

In series: Climate Change and its Causes, Effects and Prediction
Publication Date: 12/14/2020
532 pp.
Hardcover: 978-1-53618-930-8. $310.00
e-book: 978-1-53618-953-7. $310.00

American leadership and ingenuity are central to solving the climate crisis. With the devastating health and economic consequences of climate change growing at home and abroad, the United States must act urgently, guided by science, and in concert with the international community to provide a livable climate for today’s youth and future generations. This book examines the changes that need to be made to help mitigate climate change.

Natural Disasters / Flooding

The National Flood Insurance Program: Background, Issues and Reauthorization

Scott I. Newman

In series: Natural Disaster Research, Prediction and Mitigation
Publication Date: 02/17/2021
426 pp.
Hardcover: 978-1-53619-115-8. $230.00
e-book: 978-1-53619-172-1. $230.00

The National Flood Insurance Program (NFIP) was established by the National Flood Insurance Act of 1968 and was most recently reauthorized to September 30, 2020, through a series of short-term reauthorizations. The general purpose of the NFIP is both to offer primary flood insurance to properties with significant flood risk, and to reduce flood risk through the adoption of floodplain management standards. This book provides information on key components of the NFIP.

Special Topics

Advances in Environmental Research. Volume 74

Justin A. Daniels

In series: Advances in Environmental Research
Publication Date: 09/11/2020
228 pp.
Hardcover: 978-1-53618-442-6. $250.00
e-book: 978-1-53618-479-2. $250.00

Advances in Environmental Research. Volume 74 offers insight into the management of Ramsar sites in Serbia, as well as into their status as tourist destinations, through a methodological framework proposed by the UNWTO. Recent events set in motion by a new federal government that is openly hostile to environmental conservation and cultural diversity are discussed, with regard to how permanence strategies of political actors in the Amazon have been undermined.

The authors look at the management structures and processes related to green areas in Addis Ababa, with a particular focus on the level of cooperation between different stakeholders and the role of community organizations in 10 sub-cities within the Ethiopian capital.

Results are presented which contribute to the understanding of the influence of organic matter and other parameters of water and sediments on the complexation, availability, transport, and cycling of chemical species in reservoirs of the Amazon region.

Later, the toxic effects of water pollution on climate change, environment and human health are assessed, exploring the effects of industrial effluents on the environment and shedding light on future methods for industrial waste management. One study presents previously unknown information regarding the impact of turfgrass on microbial diversity in turfgrass soil, laying the foundation for further investigations on microbiota in turfgrass ecosystems.
Advances in Environmental Research. Volume 75
Justin A. Daniels
In series: Advances in Environmental Research
Publication Date: 11/04/2020
212 pp.
Hardcover: 978-1-53618-775-5, $250.00
e-book: 978-1-53618-781-6. $250.00
This compilation discusses the most relevant and state-of-the-art information related to the evolution of aldehyde dehydrogenases in the plant kingdom, their multifaceted physiological and biochemical functions, and their catalytic and structural properties. The authors discuss how plants adapt in the face of different types of abiotic and biotic stress factors, the plausible mechanisms of rhizobiome recruitment by plants, and role of rhizosphere microorganisms in developing the immunity and defence responses in plants.
In one study, the most important factors impacting the dangers of fire are analyzed though multi-dimensional statistical methods using the topographical, climatic, fuel, technical, economic, managerial and social data related to 59 large forest fires that occurred in Turkey between 1977 and 2017. Additionally, the impact of nature-based solutions on the climate resilience of cities is reviewed, particularly focusing on human health, quality of life and well-being. In closing, the authors analyze temporal landscape changes occurring in the Paraguay/Jauquara Basin, Mato Grosso State, Brazil, as well as their effects on the conservation of natural vegetation.

Advances in Environmental Research. Volume 76
Justin A. Daniels
In series: Advances in Environmental Research
Publication Date: 10/16/2020
246 pp.
Hardcover: 978-1-53618-685-7. $250.00
e-book: 978-1-53618-690-1. $250.00
Advances in Environmental Research. Volume 76 first aims to review the microbial communities of urban soils, specific factors that act in the urban environment, and the microbes' response to these impacts. Following this, the authors discuss the operation of biological wastewater treatment plants, including aspects such as effective solid-liquid separation, pretreatment systems and operating strategies. More specifically, the design of software solutions developed for the wastewater treatment plant in Făcăi, Craiova, Romania is discussed. In the subsequent paper, the authors examine eight geomorphosites that can contribute to promoting scientific tourism, and that must be preserved from environmental degradation, especially from mining exploitation and urban expansion. The concluding study focuses on the northern sector of Fuerteventura, where the urban development of Corralejo, El Cotillo, Lajares, Villaverde and La Oliva has irreversibly deteriorated a number of volcanoes and dunes of high landscape value.

Advances in Environmental Research. Volume 77
Justin A. Daniels
In series: Advances in Environmental Research
Publication Date: 10/28/2020
250 pp.
Hardcover: 978-1-53618-708-3. $250.00
e-book: 978-1-53618-759-5. $250.00
Advances in Environmental Research. Volume 77 opens with a focus on the impact and direct effects of toxicant exposure, viruses, and parasitism on individual honey bee survival, foraging behavior, and colony survival. The authors discuss how habitat fragmentation and biological invasions, considered the primary cause for biodiversity loss and the biggest threats to the conservation of ecosystems and their environmental services, interact in the presence of a natural disturbance. Experimental and evidence-based knowledge of application of burning in European grasslands is examined, as grasslands are vital elements of the historical landscape and are of crucial importance in biodiversity conservation.
Continuing, this compilation demonstrates a promising methodology for gaining a better understanding of specific interrelations of organochlorine pesticides and polychlorinated biphenyls in biomatrices. In addition, the authors aim to demonstrate the usefulness of the methodology of total health approach to study the vulnerability and effects of persistent organic pollutants in the lower basin of the Coatzacoalcos river. The domestication and basic genetics of field pea are discussed, along with current initiatives in organic production and breeding and progress related to biofortification. In closing, a brief review of the determination of programmed cell death signals during plant development or biotic-abiotic stress conditions is provided, and the reader will be informed with comparative considerations to use these methods for reliable detection.

Advances in Environmental Research. Volume 78
Justin A. Daniels
In series: Advances in Environmental Research
Publication Date: 11/04/2020
246 pp.
Hardcover: 978-1-53618-774-8, $250.00
e-book: 978-1-53618-783-0, $250.00
Advances in Environmental Research. Volume 78 offers a comprehensive critical review of alterations in different lipid classes in response to saline conditions in plants contrasting in salt resistance. A focus is provided on climate change in Odisha, India due to its rich natural and biophysical resources, and the fact that its majority population depends on these resources for survival. Following this, a comprehensive review on process control strategies, biological nutrient removal, effluent quality, electric energy consumption, exploitation problems and recent development in the applications of sequencing batch reactor-membrane bioreactors technology is presented.

In the subsequent study, wastewater from the HUST dormitory was treated in a lab-scale sequencing batch reactor-membrane bioreactors system.

Advances in Environmental Research. Volume 79
Justin A. Daniels
In series: Advances in Environmental Research
Publication Date: 11/16/2020
238 pp.
Hardcover: 978-1-53618-879-0, $250.00
e-book: 978-1-53618-888-2, $250.00
Advances in Environmental Research. Volume 79 begins with a focus on how, due to the political-economic non-robustness of centralized climate policy and the costs of mitigating catastrophic climate-change, a multi-pronged approach at the sub-global level with mitigation, adaptation and amelioration technologies can be advocated from a classical-liberal point of view. The authors attempt to address climate financial challenges, proposing insurance as the appropriate mechanism to pool funds to assist countries that have experienced damage and loss from extreme weather events. An attempt is made to illustrate the inherent oil degrading mechanism in the presence of various interacting parameters affecting bacterial growth, along with few case studies. Future opportunities that may be explored for the effective bioaugmentation of oily wastewater treatment are highlighted. The authors also examine the effects of light wavelength on flower opening and vase life using light-emitting diodes, proposing that light environment control is a powerful tool to improve the quality of cut rose and other ornamental flowers. The closing study focuses on Turkey’s position and geographical features created by differences in climate in the natural forest vegetation, shrubs or bushes, causing the formation of a variety of plants. It is estimated that the number of species of flowering plants distributed in the country is about 12,000.
The use of pesticides is essential in the current agricultural context, helping to constantly increase productivity. Contaminated Water: Pollutants, Effects and Remediation Technologies aims to gather information about their interactions in the environment and possible consequences. The authors present sustainable perspectives and alternatives for water remediation, gathering information on various residues that can be used as adsorbents and their potential against organic and inorganic contaminants. Concise information on fundamentals effecting deposition parameters and a characterization of electrodeposition is provided.

In the concluding investigation, a perchloric acid pre-treated glassy carbon electrode was fabricated by electrochemical pretreatment method using the cyclic voltammetric technique.

Critical Issues and Analysis in Fire Protection and Prevention
Axel Cablé (R&D Manager, EXEC – CEO, IBS-Conseil, Independent Expert accredited by the French Ministry of Higher Education, Research and Innovation) and Brady Manescau (Associate Professor, National Institute of Applied Sciences, France)
In series: Safety and Risk in Society
Publication Date: 10/28/2020
234 pp.
Hardcover: 978-1-53618-738-0. $160.00
e-book: 978-1-53618-796-0. $160.00
With an estimated 135,000 reported fire incidents occurring each day worldwide (CTIF World Fire Statistics Center, 2020), fire safety is a major societal and safety issue. Fires have an enormous impact on people’s lives and well-being. They cause massive amounts of air pollution, increase carbon emissions, and are responsible for the loss of invaluable natural and cultural heritage.

In the current context of climate change, it is hence crucial to develop appropriate preventive and protective measures against fire. This book is a compilation of studies and advances on the current state of research related to critical issues and analysis in the field of fire safety, with chapter contributions from various countries and research institutions worldwide (Australia, Chile, France, India and USA). It aims to provide a broad picture of currently faced challenges and potential solutions from passive and active protective measures, to modelling and experimentation related to compartment and wild fires.

Chapters 3 and 4 are dedicated to the fire resistance and the pyrolysis study of innovative composite materials and bio-based flame retardants, notably for vehicle and aircraft applications.
Chapter 5 discusses the challenges related to the fire protection of built cultural heritage and evaluates the performance of an innovative sprinkler fire suppression system.
Chapter 6 addresses the issue of forest fires and provides a methodology to improve the emergency response time at urban-forest interfaces.
Chapter 7 opens up the discussion and provides potential solutions to help reduce the occurrence of wildfires and increase community safety in the context of climate change by involving renewable energies and local fire stations.
Climate Change issues have traditionally broken into two basic categories: climate change mitigation and climate change adaptation. Climate change mitigation includes human interventions to reduce drivers of climate systems and climate change adaptation includes managing natural and human systems in response to variations in the climate and their effects. Efforts to mitigate climate change have focused on reducing greenhouse gas emissions (GHG) into the atmosphere which is a complex journey towards sustainable development. Mitigation strategies include adopting renewable energy sources such as solar, wind, hydro, biofuels, and the sustainable use of land and forests. This book argues green entrepreneurship is one of the most effective strategies for greenhouse gas emissions reduction. This book discusses the linkages between climate change mitigation and green entrepreneurship, describing the challenges and possibilities of adopting green entrepreneurship in Bangladesh.

Environment has become a central issue in the present day world. Environmental sustainability has been advocated as a major goal to deal with growing problems of pollution that threaten the very existence of the human beings. The dismal picture of global warming brings to the attention the necessity of environmental performance so that the governments in the world can take positive steps toward sustainability. The book uses the data from the Yale Center for Environment and Policy. It uses Environmental Performance Index (EPI) prepared by the Yale Center. The book explores the relationship between environmental performance and democracy, ideology, leadership, good governance, participation in international agreements, economic factors, and globalization.

In recent years, due to the growing consciousness of environmental issues in different chemical processes, green chemistry has become a focus of many researchers. As such, Environmentally Friendly Technologies: Advances in Research and Future Directions explores how green chemistry aims to design new, environmentally benign chemical processes and synthetic methodologies in order to reduce or eliminate the usage of hazardous and toxic chemicals. The results of some experimental studies concerning anodic electrochemical polishing of mild steel, stainless steels, aluminium, nickel, and nickel-copper alloy in choline chloride-based deep eutectic solvents are presented.
The authors review various sustainable techniques for machining difficult to machine materials, along with the combination of these techniques which may be most efficient. Also reviewed in this compilation are the principles and advantages of a supercritical fluid system as a current green carrier medium, as well as scientific literature with commercial developments. In closing, the importance of pigments obtained from plants is emphasized, and plant-derived pigments are compared to synthetic pigments. The economic and environmental effects of the pigments are also systematically discussed.

**Leukemia. Radiation. Chernobyl (Oncohematological Consequences of the Chernobyl Catastrophe)**

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In series: *Nuclear Materials and Disaster Research*

Publication Date: 10/09/2020

190 pp.

 Hardcover: 978-1-53618-699-4. $160.00


The Chernobyl disaster of 1986 is among the largest technogenic catastrophes in the history of humankind. The vast territories of Ukraine, Republic of Belarus, Russian Federation as well as bordering European states have been exposed to the contamination by the long-lived radionuclides released from the destroyed nuclear power station. The medical consequences of the Chernobyl catastrophe are being studied for more than three decades. In fact, the increased risk of certain forms of leukemia is among the major stochastic effects of radiation exposure. Nevertheless, the final unambiguous conclusions as to the role of low-dose radiation exposure in the induction of leukemia are still pending.

The book presents the results of studies on the diagnosis of various forms of hematological malignancies in Ukrainian patients provided for more than thirty years in the Oncohematology Department of RE Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology, the National Academy of Sciences of Ukraine. Among the groups of leukemia patients were the Chernobyl clean-up workers as well as the patients from Ukrainian population (adults and children) inhabiting the territories with different levels of radionuclide contamination. For the first time, some trends in the patterns of hematological malignancies in several sample groups under study have been identified throughout the post-Chernobyl period. The putative association between the low dose radiation exposure and the increasing risk of acute myeloid leukemia, myelodysplastic syndromes and chronic lymphocytic leukemia has been discussed based on the findings of the authors of the book as well as the data of the available literature.

**Nova Excerpts: Environmental Sciences**

Dominik Lucas

In series: *Nova Excerpts*

Publication Date: 12/22/2020

242 pp.

 Hardcover: 978-1-53619-056-4. $125.00

e-book: 978-1-53619-074-8. $125.00

Nova Excerpts: Environmental Sciences is a compilation of Abstracts and Introductions from a wide variety of Environmental Science books Nova has published over the years. Each excerpt includes the title of the original book where the original content was published should readers be interested in learning more. Nova Excerpts is published simultaneously in both print and digital formats.
Sustainable Natural Resource Management in the Himalayan Region: Livelihood and Climate Change

Roshan Man Bajracharya, Ph.D. (Department of Environmental Science and Engineering, Kathmandu University, Dhusikhel, Nepal), Bishal Kumar Sitaula, Ph.D. (Department of Environment and Development Studies (Noragric), Faculty of Landscape and Society, Norwegian University of Life Sciences, Aas, Norway), Smriti Gurung, Ph.D (Department of Environmental Science and Engineering, Kathmandu University, Dhusikhel, Nepal) and Nani Raut, Ph.D (Department of Environmental Science and Engineering, Kathmandu University, Dhusikhel, Nepal)

In series: Environmental Research Advances
Publication Date: 02/10/2021

The greater Himalayan region, stretching from Afghanistan in the west to Myanmar in the east, is home to about a quarter of a billion people who greatly depend on available natural resources for their survival and livelihoods. The ever-increasing population pressure and changing climate have grave implications for the sustenance of human health and habitation in the foreseeable future. The region is confronted with numerous challenges related to forest degradation, land productivity, disaster risk, water management, biodiversity loss, erratic climatic patterns, as well as socio-political capacity. The limits of arable land have essentially been reached, while the need for enhancing production to sustain human nutritive requirements and livelihoods continues to increase. Hence, the intensification of agriculture has become a necessity rather than a choice. Yet, producing greater numbers of crops and quantities of food, fiber and other materials on the same parcel of land runs the risk of degrading the soil fertility, productivity and overall quality. Therefore, means to achieve this without irreversibly damaging the soil and land resource base have become imperative. To this end, agro-forestry, agro-silvi-pastoral systems, and the adoption of a variety of regenerative crops, soil and water management and conservation practices offer the potential to deliver multiple benefits without sacrificing the very resource upon which the human population depends. The need for ecologically sound and sustainable management of natural resources in the Himalayan region, as well as the adaptation of local communities to the impacts of climate change and measures for its mitigation, cannot be over-emphasized. This book presents findings on approaches to sustainable land management and the intensification of agriculture and animal husbandry related to soil organic matter management and carbon sequestration for multiple benefits; and the agroforestry as a crop diversification strategy with livelihood and climate mitigation/adaptation benefits, along with other aspects of forest, biodiversity and water resources management. The book deals with technical, socio-economic, policy and biodiversity issues related to the sustainable use and management of natural resources, namely forests, soil/land, water, crops, animal husbandry and diversity of flora/fauna, as well as disaster risk and vulnerability of communities in the Himalayan region. There is a continuing need to study and research approaches for harmonizing human needs and lifestyles with natural ecosystems and processes so that both may co-exist in a mutually beneficial manner.

Waste

Bio-Waste as Potential Activated Carbon in Remediating Dye Solution

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In series: Environmental Science, Engineering and Technology
Publication Date: 12/11/2020
This book introduces the use of bio-waste as a raw material for the preparation of activated carbon (AC) for dyes removal. Activated carbon was derived from assorted materials that have potential to function as a good adsorbent, especially for dyes removal in wastewater treatment. This book was written as a case study to help readers understand the function of AC in each system and approach. This book includes applications of AC derived from corn cob; palm tree empty fruit bunch; seashell; eggshell; spent coffee ground; kenaf fiber and coconut frond in dyes removal and wastewater treatment. The efficiency of activated carbon prepared from various bio-wastes is evaluated by calculating the removal rate of dyes in wastewater. This unique book features eight chapters pertinent to the current situation, as loads of dye effluent are being discharged into the environment. The characterization of the produced AC is analysed using various instrumentations such as scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The book will attract Eastern and Western researchers and scholars at all levels of degree qualification, industrial practitioners and entrepreneurs in the field of bio-waste.

**Life Sciences**

**Biology**

**Advances in Medicine and Biology. Volume 169**

*Leon V. Berhardt*

In series: *Advances in Medicine and Biology*

Publication Date: 10/09/2020

240 pp.

Hardcover: 978-1-53618-607-9, $250.00

e-book: 978-1-53618-669-7, $250.00

Advances in Medicine and Biology. Volume 169 begins with a focus on psoriasis, a chronic inflammatory skin disease that displays autoimmune traits with strong genetic predispositions. Often, psoriasis is associated with significant physical or psychosocial burden, poor quality of life and significant long-lasting impairments. Following this, the authors discuss matrix metalloproteinases, multi-domain proteins with activities regulated by tissue inhibitors of metalloproteinases. Cryptorchidism, a congenital pathological condition characterized by the failure of testes to descend to the scrotum, is also discussed. Exposure to environmental toxicants, pesticides, pharmaceuticals and drugs of abuse can lead to altered reproductive parameters like histopathology of reproductive organs, sperm morphology, altered hormone level, oxidative stress and inflammation. As such, the subsequent study deals with different toxicants and their routes of exposure. The role that endometriosis, polycystic ovary syndrome, endometriol polyps and uterine fibroids may play in female infertility is examined. The authors present three cases of twin pregnancy with complete hydatidiform mole and a coexisting normal fetus. The course of pregnancy, ultrasound findings, and histological and immunohistochemical characteristics are described along with the p57 status. In the closing study, the mode of action, indications, contraindications, side effects, drug-drug interactions and pharmacokinetic parameters of secnidazole are discussed in detail.
Since the appearance of Darwin's book, "The Origin of Species," adaptation is one of the processes that explains the diversity of species in ecosystems. Adaptive phenomena in the 19th century and until the mid-20th century have been analyzed in macroscopic biological systems, however since the second half of the 20th century and to date the development of disciplines such as Molecular Biology, has allowed us to delve into the mechanisms that regulate cell physiology.

The molecular bases that allow explaining the adaptation processes of microorganisms to their environment have special relevance, because through their analysis it is possible to size the complexity of these mechanisms that involve receptors of a protein nature associated with transduction chains that transport the information flow to genomic DNA, and which subsequently involves the emission of a response through the expression of specific genes.

From the point of view of the adaptive phenomenon analysis, the approach through the molecular bases makes it possible to understand the enormous diversity of the microbial world. Mainly for two reasons, on the one hand the presence of micro gradients in the bacterial ecological niches that are continuously fluctuating, which forces the microorganisms to a rapid adaptation phenomenon. And on the other hand, horizontal gene transfer phenomena, which allow bacteria the information exchange. These two elements carry great intensity in establishing new relationships. This phenomenon is especially relevant if it is related to a concept that Darwin cites in the Origin of Species, "The tangled riverbank", where it is emphasized that the new interactions establishment is the basic driving force for the new species generation. This phenomenon is explained by the positive feedback loop generation, whereby ecosystems with high levels of biological diversity generate new interactions that lead to new species, which in turn tends to make the ecosystem network more complex. This complexity analyzed in its molecular bases allows to generate new research questions that can be applied to other knowledge areas, such as Biotechnology.

The analysis of the molecular bases of the microorganisms adequacy, makes it possible to identify and characterize mechanisms that implemented in different pharmaceutical areas and agricultural industry has led to the product generation with high added value, a clear example of this economic development is the enzyme industry and even recombinant protein production.

Finally, it is convenient to emphasize the need to incorporate the analysis of the molecular bases of adaptation from the perspective of omics techniques. Techniques that allow the study of processes and mechanisms to be approached from a global perspective.

This book summarizes some topics of special relevance referring to adaptive processes of different microorganisms of special relevance both in basic and applied research.
The factors causing multi-drug resistance are highlighted, including under or overuse of antibiotics, prolonged use of antibiotics, poor infection control, poor hygiene and sanitation.
The exponential influx of scientific research on melatonin is associated with a greater orientation towards the study of the systemic effects of melatonin and their derivatives, as well as their clinical implications. Proof of this fact is summarized in the present compilation, where melatonin is presented as a remarkable agent to counteract most of the physiopathological events that trigger several disorders. The book also collects evidence about melatonin’s interactions with two high-affinity G protein-coupled receptors to provide new pharmacological targets for the treatment of cancer, neurological or endocrine conditions. The present review also includes detailed coverage of molecules with improved safety profiles and melatonin receptor agonists (such as ramelteon, tasimelteon, and agomelatine), and the latest findings on the role of melatonin in protecting plants from abiotic stress, improving their resistance to adverse conditions, regulating several environmental stresses including heat stress, as well as the clinical use of melatonin in the treatment of fertility-related problems and reproductive health.

The multiplicity of actions of melatonin, including modulating immune responses and inflammation and maintaining mitochondrial integrity, make this indoleamine a valuable therapeutic agent in the treatment of neurodegeneration, polycystic ovary syndrome, brain ischemia and traumatic brain injury, fibromyalgia, optic neuritis and glaucoma, alone or in combination with other drugs.

Melatonin easily crosses the blood-brain and placental barriers. In this sense, this book provides a complete review suggesting that melatonin supplementation should be considered as a potential disease-preventing agent, with the aim of extending pregnancy duration to improve clinical outcomes and prevent fetal brain damage for pregnancy pathologies, such as preeclampsia, intrauterine growth restriction and preterm birth.

Within the last few decades, melatonin has emerged in clinical oncology as a naturally occurring bioactive molecule with substantial anticancer properties. In addition, this chronobiotic agent exerts oncostatic effects throughout all stages of tumor growth, from initial cell transformation to mitigation of malignant progression and metastasis. Its therapeutic applications in oral cancer, gastrointestinal pathologies and colorectal cancer are discussed, as well as its applications as an adjuvant for alleviating side-effects and improving the welfare of radio/chemotherapy-treated patients.

In the final chapter, the authors summarize the indications for the development of new galenic formulations of melatonin. Thus, different melatonin formulations, such as intranasal solutions, sprays, microspheres, gels and liposomes would allow for the maintenance of endogenous active concentrations for a long time, avoiding poor oral bioavailability.

**The Biochemical Guide to Medicinal Plants**

*Dorota Bartusk-Aebisher (Professor, Medical Faculty, University of Rzeszow, Poland) and David Aebisher (Professor, Medical Faculty, University of Rzeszow, Poland)*

In series: Biochemistry Research Trends
Publication Date: 12/22/2020
352 pp.
Hardcover: 978-1-53618-902-5. $230.00
E-book: 978-1-53618-993-3. $230.00

The Biochemical Guide to Medicinal Plants presents the study of medicinal plants and organic chemistry, forming a bridge between the biology and chemistry of medicinal plants by studying complex chemical interactions. The book consists of 45 chapters, each describing one medicinal plant with figures. We present species of herbaceous and woody plants found on various continents and in various habitats, presenting their various adaptations to the environment. The book contains information about plants’ range, appearance, and biological and ecological characteristics, and the descriptions are enriched with surprising curiosities. The book also contains data on the plants’ life spans and flowering periods. Plants used as spices, plants that have no flowers, forest and meadow plants, and plants with medicinal and poisonous properties are described. The reader will learn about the properties of medicinal plants characteristic for each season. This book shows the beauty of plants used in medicine, with their richness of shape, color and fragrance.

**Botany**

**Apiaceae: Ecology, Uses and Toxicity**

*Isiah Douglas*

In series: Plant Science Research and Practices
Publication Date: 01/21/2021
164 pp.
Softcover: 978-1-53619-060-1. $95.00
E-book: 978-1-53619-158-5. $95.00

The Apiaceae are a large botanical family, with economically important taxa and medicinal interest due to their secondary metabolites. Despite the importance of Apiaceae plants, particularly for the management of CVDs (cardiovascular diseases), no
systematic review has been conducted compiling the traditional uses ascribed to some of these species and the scientific studies validating the reported effects. Therefore, in the first chapter, a systematic review was carried out in order to gather the available information. In addition, the effects of isolated compounds, as well as the underlying mechanisms of action of both plant extracts and compounds was included. Also, the safety profile of Apiaceae extracts used to manage CVDs was highlighted. In the second chapter, the chemical composition, cultivation and uses of anethum graveolens (one of the species is the family Apiaceae) is explored. In the last chapter of the book, three poisonous plants (Conium maculatum, Cicuta sp. and Aethusacynapium. Conium maculatum) of the Apiaceae family are explored in detail.

Brassica juncea: Production, Cultivation and Uses
Dr. Dhriti Kapoor (Department of Botany, School of Bioengineering and Biosciences, Lovely Professional University, Phagwara (Punjab), India) and Dr. Vandana Gautam (College of Horticulture and Forestry (Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan, H.P.), Neri Campus (Himachal Pradesh), India)
In series: Botanical Research and Practices
Publication Date: 03/04/2021
308 pp.
Hardcover: 978-1-53619-241-4, $230.00
e-book: 978-1-53619-289-6, $230.00
Brassica juncea is a salient oilseed crop and contributes highest in domestic edible oils. It belongs to Brassicaceae family (Cruciferae). This annual herb is widely known for its adaptation to varying climatic conditions and manifest tolerance to diverse soil types. Most of Brassica species are diploid and amphidioploid. Brassica juncea (n=18) which is commonly known as Indian mustard. It is Asiatic in origin with prime centre of its diversity found in china from where it migrated to India via Afghanistan and other countries. Mustard is largely self-pollinated rabi season crop of temperate region, which relatively requires cool temperature for its growth and thrive well in irrigated and rainfed conditions. Seeds of mustard serve as a cheapest and healthiest source of oil in regular diet. Apart from its culinary purposes, it is also used in preparation of soaps, hair oils, lubricants, paints and as a condiment in pickles. Mustard oil extracted from this plant leads to the creation of by-product known as mustard cake, which is used as manure. This oil cake is used as cover crop for animal fodder due to its high protein and glucosinolate content. Brassica juncea plants are medicinally important source of phytochemical compounds of therapeutic significance. Brassica plants are studied for their bioactive potential and are reported to contain several other classes of alkaloids, tannins, saponins, anthocyanins, phytosterols, glucosinolates, phytoestrogens, terpenoids, glycosides, vitamin C, vitamin E, aliphatic and aromatic amines. Due to presence of these compounds, the plant displays anti-bacterial, anti-malarial, anti-hyperglycemic, anti-aging, anti-proliferative, anti-ulcer, anti-hyperlipidemic, anti-genotoxic, neuroprotective, anti-diabetic and antioxidant activities.

Brassica juncea has the potential to eliminate, detoxify or sequester heavy metals from polluted soil. Sequestrating ability of Brassica juncea pivots upon mobility of toxic substance, plant attribute and crop management aspects. The crop management aspects include above surface biomass of plants, intercropping, amendment of organic matter and incorporation of legumes for better phytoextraction via India mustard through boosting growth and soil metal dissipation. Brassica juncea are described as hyperaccumulator, as they are able to uptake high amount of heavy metals such as lead, copper, nickel from contaminated sites. The metal uptake by Brassica juncea is influenced by heavy metal availability in surroundings, rate of metal accumulation by roots, percentage of heavy metal fixed in the roots, rate of metal storing in xylem and transferring heavy metals to shoots and resistance of cells for heavy metals. Brassica juncea can effectively be cultivated and render soils contamination free. Assorted agronomic practices comprising irrigation, weed management, addition of fertilizers and chelators augments Brassica juncea potential. It exhibits noteworthy contribution in the world. Keeping these points in mind, various aspects like the botanical description, economic importance, cultivation practices, therapeutic potential and phytoremediation capacity of Brassica juncea has been described in this book. Apart from this, various breeding methods, genetic and molecular approaches have been well explained to improve the quality of this crop.

Capsicum: Production, Varieties and Nutrition
Pete Norris
In series: Plant Science Research and Practices
Publication Date: 11/13/2020
172 pp.
Softcover: 978-1-53618-821-9, $95.00
e-book: 978-1-53618-851-6, $95.00
Capsicum is the name of the pepper plant genus that includes 27 species, which range from sweet bell peppers to the hottest peppers on the planet. Due to variations in
climatic conditions, insects show varying trends in their incidence and extent of damage to the crop. This compilation discusses how, as an effect of these interactions, the production of pepper is affected quantitatively but especially qualitatively. Additionally, the authors study the effect of capsaicin at the cellular signalling level, gene expression, and the use of bioinformatics to understand the mechanism of cell signalling and regulation of gene events taking place between tumorous cell and capsaicin receptors.

In closing, all in vitro/in vivo methods reported so far for obtaining doubled haploids in both sweet and hot pepper are compared. The androgenesis, gynogenesis and efficiency are discussed in both hot and sweet pepper species.

Elementary Knowledge of Indian Medicinal Plants of Uttarakhand Himalaya
Mayaram Uniyal (Director, CCRAS, Ministry of AYUSH, Govt. of India), Deepak Kumar Semwal (Department of Phytochemistry, Uttarakhand Ayurved University, India), Ruchi Badoni Semwal (Assistant Professor at Govt. Postgraduate College, Rishikesh, India) and Ankit Kumar (Senior Research Fellow in the R&D Centre, Faculty of Biomedical Sciences, Uttarakhand Ayurved University, India)

In series: Plant Science Research and Practices
Publication Date: 01/20/2021
468 pp.
Hardcover: 978-1-53619-078-6. $270.00
e-book: 978-1-53619-126-4. $270.00

Elementary Knowledge of Indian Medicinal Plants of Uttarakhand Himalaya mainly focuses on the taxonomy and ethnomedicinal uses of plants, and the information provided can be used to identify plants while surveying medicinal plants in the region. This compilation will be helpful for researchers and students working in the field of plant science and other related fields. This textbook is divided into five chapters, and the first chapter reviews the historical aspects of India in terms of traditional knowledge. The second chapter provides a general introduction to the biodiversity of medicinal plants in Uttarakhand, a Himalayan state of India, as well as its geography, population, herbal sector status, temperature and altitudes. The third chapter reviews 600 flowering plants belonging to 108 families. Each plant is described using its Ayurvedic/Sanskrit name, vernacular/local name, botanical properties, distribution, medicinal properties, phytochemical constituents and pharmacological status. The fourth chapter discusses 14 gymnosperms belonging to four families, and the fifth chapter discusses 18 pteridophytes from two families. Photographs of selected plants are also included in a separate section.

Moringa oleifera: Properties, Applications and Health Effects
Daniel S. Figueroa

In series: Plant Science Research and Practices
Publication Date: 01/05/2021
402 pp.
Hardcover: 978-1-53618-890-5. $230.00
e-book: 978-1-53619-070-0. $230.00

Moringa oleifera is a widely cultivated and highly valuable tree belonging to the family Moringaceae, originating in India. This compilation explores its wide variety of uses, including in food, traditional herbal medicine, water purification and as an insecticide.
Ocimum basilicum: Taxonomy, Cultivation and Uses
Andres A. Walton
In series: Plant Science Research and Practices
Publication Date: 02/26/2021
139 pp.
Softcover: 978-1-53619-265-0, $95.00
e-book: 978-1-53619-306-0, $95.00
Ocimum basilicum L. is an aromatic herb commonly known as sweet basil or sweet tulsi. It is rich in secondary metabolites like phenols, alkaloids, terpenoids, aldehydes, flavonoids, steroids, glycosides, essential oils, saponins, and tannins. The presence of these compounds makes sweet basil one of the most commonly used plants in aromatherapy, perfume, cosmetics, and in foods. The utilization potential of the sweet basil in different industrial sections increases its importance. The first chapter outlines secondary metabolites of sweet basil and their importance in different aspects. The second chapter considers the recent concepts of application of organic manures in integration with inorganic fertilizers in different reviews and research studies that fulfills the nutritional needs in sweet basil and gives the best quality of it. The third chapter summarizes the potential uses, cultivation, and available germplasm of O. basilicum in Turkey. The fourth chapter reviews literature on antiviral activity of O. basilicum to find molecules capable of inhibiting the SARS-CoV-2 main protease. This could permit the use of this plant in the fight against COVID-19 and associated diseases. The last chapter is an examination of antisickling activity of Ocimum Basilicum and some of its compounds.

Ocimum: An Overview
Merlin Blanchard
In series: Herbs and Herbalism
Publication Date: 09/18/2020
248 pp.
Hardcover: 978-1-53618-465-5, $160.00
e-book: 978-1-53618-586-7, $160.00
Ocimum: An Overview highlights the major milestones in the last three decades of taxonomical identification of Ocimum, providing insight into its potentialities and present demands. The authors explore the utilization of in vitro plant tissue cultures and genetic transformation systems for the improvement of sweet basil. An overview of the primary phenolic compounds found within basil is provided, along with their associated health benefits, and various strategies used to increase phytochemical levels in basil are discussed. Traditional uses of basil are discussed, including in the treatment of head colds and as a cure for warts and worms, as well as an appetite stimulant, carminative, and diuretic. The leishmanicidal and antimicrobial properties of Ocimum are discussed in an effort to assess its potential utility in the production of antimicrobials and leishmanicidal agents of natural origin. In closing, the authors summarize the main data on the biologically active substances and therapeutic activities of Ocimum species based on the current evidence.

Origanum: Taxonomy, Cultivation and Uses
Roger Ingram
In series: Botanical Research and Practices
Publication Date: 02/15/2021
104 pp.
Softcover: 978-1-53619-236-0, $82.00
e-book: 978-1-53619-249-0, $82.00
Chapter 1 focuses on taxonomic, cultivation and the pharmacological and other uses of Origanum species. In Chapter 2, Origanum’s role in synthesising the metal nanoparticles such as titanium dioxide, palladium, silver, gold, palladium nanoparticles supported on magnetic graphene oxide has been discussed in detail. Hence, researchers are using Origanum as a precursor in plant-mediated synthesis. In the last chapter, the authors discuss Origanum, the Turkish spice, which has a history dated back to centuries. This herb has found wide applications due to the presence of primary and secondary metabolites.
Passiflora: Genetic, Grafting and Biotechnology Approaches
Alejandro Hurtado Salazar (Universidad de Caldas, Manizales, Caldas, Colombia), John Ocampo (Universidad Nacional de Colombia, Palmira, Valle del Cauca, Colombia), Nelson Ceballos-Aguirre (Universidad de Caldas, Manizales, Caldas, Colombia), Dora Janeth García Jaramillo (Universidad de Caldas, Manizales, Caldas, Colombia) and Walter Ricardo Lopez (Universidad Nacional de Colombia, Manizales, Caldas, Colombia)
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Publication Date: 02/17/2021
206 pp.
Hardcover: 978-1-53619-108-0. $160.00
e-book: 978-1-53619-255-1. $160.00
The diseases are among the main factors responsible for the low productivity and losses in commercial passion fruit crops. Among the agents that cause pathologies, Fusarium oxysporum S, Fusarium solani Sacc and Phytophthora spp., deserve attention. The use of tolerant cultivars stands out as one of the most effective, economic and ecological measures in the control of the disease. In the case of passion fruit, this strategy is essential based on the high susceptibility of current cultivars. Fusarium spp normally compromises the efficiency of the root system, as well as the conductive vessels of the sage, reducing the longevity of the plant and limiting the use of the areas contaminated by the fungus.
Tolerance to F. solani was found in Passiflora giberntii N.E. Brown, P. nítida Kunh, P. macrocarpa Mast, P. quadrangularis L., P. setacea L., P. alata Curtis and P. caerulea L., presenting grafting with the use of tolerant species a viable alternative to attenuate the problems caused by this fungi. Thus, with the use of tolerant wild species as rootstock, it allows coexistence with premature death of plants and provides the formation of healthier and uniform crops. However, there is little information on the effect of wild Passiflora species such as passion fruit rootstock.

Recent Developments in Jatropha Research
Juan Francisco García-Martín, PhD (Associate Professor, Department of Chemical Engineering, University of Seville, Spain)
In series: Plant Science Research and Practices
Publication Date: 02/05/2021
322 pp.
Hardcover: 978-1-53619-132-5. $230.00
e-book: 978-1-53619-190-5. $230.00
The genus Jatropha comprises a range of species with a wide range of potential applications. For instance, J. dioica and J. curcas have important medicinal, pharmaceutical and food uses, as described throughout the book. Most of the chapters of this book are focused on this later species, which is considered as the most promising and the one with the most applications. J. curcas oil is used as substrate for biodiesel production and, due to its high tolerance and uptake of metals, this plant is also used in phytoremediation, to be specific for the remediation of degraded mining areas. This book presents an overview of both current and promising applications of the species of Jatropha to the agricultural, mining and biofuel industries and, to lesser extent, the pharmaceutical and food industries. The agronomic practices (genotypes, plant density, fertilization, pruning and harvest date) are described as well. The most recent developments are discussed and the future prospects for research in these fields are explored.

Salicylic Acid Contribution in Plant Biology against a Changing Environment
Dr. Dhriti Kapoor (Department of Botany, School of Bioengineering and Biosciences, Lovely Professional University, Phagwara (Punjab), India), Dr. Vandana Gautam (College of Horticulture and Forestry (Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan, H.P.), Neri Campus (Himachal Pradesh), India) and Prof. Renu Bhardwaj (Department of Botanical and Environmental Sciences, Guru Nanak Dev University, Amritsar, Punjab, India)
Salicylic acid (SA) chemically known as 2-hydroxy benzoic acid, is a ubiquitous endogenous plant growth regulator of phenolic nature, synthesized by plants which acts as a vital endogenous signaling molecule in plant immune response. SA is recognized as a multifaceted element that have crucial roles in various plant physiological processes such as seed germination, seedling growth, photosynthetic activity, nutrient absorption and transport, respiration, nitrogen metabolism, thermogenesis, stomatal closure, flowering, expression of senescence-related genes, inducing antioxidant defense system and resistance to a broad spectrum of pathogens. SA mode of action varies with plant species, plant developmental phase, its mode of application, and its endogenous level in the plant. SA have high metabolic and physiological activity therefore, involved in the activation of plant defense responses against biotic and abiotic stress factors and also involved in the transcriptional reprograming and in controlling transcription and expression of several defense related genes. SA in minor quantities provide plant stress tolerance, but high amounts of SA triggers oxidative stress due to generation of plethora of ROS which ultimately lead to cell death. Under stress conditions, SA interplays with reactive oxygen species (ROS) as crucial signaling molecules for inducing genetically controlled defense-related mechanisms and expression of genes that cause defense against stress. Keeping these points in mind, various aspects like significance of SA for plants, its stress mitigation properties as well as cross-talk with other plant growth regulators have been mentioned. The book has seven chapters which deal with the role of phytohormone salicylic acid in plants, its mechanism of synthesis, signaling & homeostasis in plants, its crosstalk with ROS in mitigation of stress and its interaction with other plant growth regulators.

We believe that this book comprises a wealth of knowledge to botanists, agriculturists, students and researchers of colleges and universities.

**Sugarcane: Production, Properties and Uses**

Elisa Russo

In series: *Plant Science Research and Practices*

Publication Date: 09/24/2020

212 pp.

Hardcover: 978-1-53618-417-4. $160.00

e-book: 978-1-53618-589-8. $160.00

Sugarcane: Production, Properties and Uses provides details on new industrial technologies of the ethanol extraction process through mathematical modeling for bioenergy crops, socioeconomic and environmental aspects based on Circular Economy concepts, and some commercial and industrial applications in thermal power plants and/or biorefineries. Lignocellulosic biomass is the most abundant of terrestrial feedstocks available for producing chemicals and materials as well as harvesting energy. As such, this compilation aims to describe the structure of sugarcane lignin, as well as its isolation, characterization, and applications.

The authors study the co-digestion of sugarcane vinasse and glycerin in a thermophilic anaerobic sequencing batch biofilm reactor, which has not previously been studied.

Additionally, they evaluate the option of using sugarcane cultivars in the production of sucrose in Mexico as a livestock feed source in the dry season, with the determination of variables such as stem height, stem diameter, Brix degrees, health and flowering.

Following this, variations of phenol accumulation in healthy sugarcane plants or sugarcane plants experimentally infected with Xanthomonas albilineans, the bacteria that causes leaf scald, are studied.

The concluding work evaluates the emissions of gases from a bench diesel engine combustion with different diesel/biodiesel blends from beef tallow/sugarcane diesel in the proportions CD10, CD-B15, CD-B25, CD-B35 and CD-B50, in order to simulate biofuel combustion emissions at different concentrations.
A Closer Look at Membrane Proteins
Tristan B. Møller

In series:
Publication Date: 09/18/2020
163 pp.
Softcover: 978-1-53618-149-4, $95.00
e-book: 978-1-53618-538-6, $95.00

A Closer Look at Membrane Proteins opens with a description of the insulin-like growth factor system, with focus on the insulin-like growth factor receptors and functions associated with them. The data on membrane proteins, their N-glycome and oxidation status is related to the authors’ findings on the receptors in different physiological and pathological conditions, such as normal and abnormal tissue growth and development. Next, a review of the current methods used to prepare and study membrane proteins is presented, with focus on large scale simulations and special emphasis on scalable parallel methods.

In closing, commandments surrounding integral membrane protein expression and purification, integral membrane protein biochemistry, integral membrane protein functionality studies and integral membrane protein high-resolution structures are described.

Human Mesenchymal Stem Cells
Mitchell Khan

In series: Stem Cells - Laboratory and Clinical Research
Publication Date: 02/09/2021
134 pp.
Softcover: 978-1-53619-155-4, $82.00
e-book: 978-1-53619-224-7, $82.00

In Chapter 1, the COVID-19 pandemic and the damage mechanisms on the cellular level which can be ameliorated with the cellular therapies is thoroughly evaluated. Previous and ongoing stem cell clinical trial data from diseases with similar symptoms is gathered. All this accumulated data and current clinical trial results indicate that the cellular therapies could be the most effective treatment option for COVID-19 patients to ameliorate the damaged tissues and save lives. In Chapter 2, the authors examine activated mesenchymal stem cells for stroke repair. Stem Cell treatment has shown recovery in animal models of stroke, indicating an improved regenerative and repair potential. Though stem cells are still being used in clinical trials, there is no evidence that they enhance recovery in ischemic stroke patients. Nevertheless, the multipotent mesenchymal stem has widely been explored for stroke recovery. An ‘Activated MSC’ as a therapeutic alternative to tackling ischemic stroke is proposed, thereby the activation of MSCs by cytokines, growth factors, hypoxia, pharmacological drugs, etc., could be a novel approach to improving stroke patients’ responses to receiving MSCs. In Chapter 3, the potential benefits of in vitro culture of therapeutic stem cells in the presence of HB along with the ketogenic diet, whereby higher physiological concentrations of ketone bodies can be achieved in vivo, as an adjuvant to stem cell transplantation is assessed.

Na+K+-ATPase: Discovery, Functions and Regulation
Mohammed Awad Ali Khalid (Assistant Professor of Chemistry, University of Taif, Saudi Arabia; Department of Chemistry, Turabah University College, University of Taif, Taif, Saudi Arabia; Associate Professor of Chemistry, University of Khartoum, Sudan)

In series: Cell Biology Research Progress
Publication Date: 01/08/2021
161 pp.
Softcover: 978-1-53618-968-1, $95.00
e-book: 978-1-53618-050-2, $95.00

Sodium–potassium adenosine triphosphatase (Na+/K+-ATPase) is an enzyme located in the plasma membrane of most eukaryotic cells, responsible for maintaining ion concentration gradients against their concentration scale using ATP hydrolysis as a source of energy. The enzyme is involved in many cellular activities, including maintaining cell volume, transporting nutrition, electrical potential, neurotransmission, and any dysfunction or modification of enzyme activity is directly linked to many
diseases, such as epilepsy, cardiovascular disease and hypertension, diabetes and other metabolic disorders, digoxin toxicity, fetal abnormalities, neurological disorders, and pulmonary conditions.

In this book, the authors present current research on regulation strategies, Na+/K+-ATPase as a biomarker in diseased states, and the use of Na+/K+-ATPase in the physiological and ecological adaptations of insects. Other topics discussed in this compilation include the effects of hormonal and non-hormonal stimulation on Na+/K+-ATPase activity, the physiology and pathophysiology of Na+/K+-ATPase, Na+/K'-ATPase as a biomarker for energy metabolism and oxidative stress in diseased states, the neurotensin inhibitory effects of [3H]-Ouabain binding to striatal membranes and inversion by administration of clozapine, and Na+/K+-ATPase’s important functional roles in human body.

**Marine Biology**

*Dinoflagellates: Classification, Evolution, Physiology and Ecological Significance*

D. V. Subba Rao (Adjunct Research Professor, Center for Global Health, Dept. Medicine, University of New Mexico, Albuquerque, NM, US)

In series: *Marine and Freshwater Biology*

Publication Date: 09/02/2020

755 pp.

Hardcover: 978-1-53617-888-3. $340.00
e-book: 978-1-53617-889-0. $340.00

Dinoflagellates are fascinating protists, mostly unicellular, distributed in environments ranging from the polar to tropical seas, hypersaline, coastal, estuarine and oceanic waters. There are about 2,377 dinoflagellate species recognized. They exhibit a great diversity of shape, size, biochemical composition and physiological characteristics. Generally free floating, dinoflagellates are photosynthetic, a few species such as the Symbiodinium are symbiotic, living in corals, while a few are parasitic.

This volume presents a discussion on dinoflagellate phylogeny based on recent developments in molecular biology. It provides insights into the similarity of pigment composition with other microalgae. A comprehensive coverage of their carbon assimilation rates is presented, which appear to be low compared to other microalgae. Besides photosynthetic assimilation, an interesting aspect of acquiring carbon is through mixotrophy which appears to be wide spread amongst dinoflagellates and a thorough discussion is presented.

Key features of this book include recent methods of culturing dinoflagellates, which can serve as analogues of their blooms in understanding their physiology, biochemistry and production of phycotoxins. This book, based on massive data collected over decades of research, provides an informative overview on the spatial and temporal distribution and dispersal of dinoflagellates by ocean currents, ballast water introductions and climate changes. About 70 species of dinoflagellates are implicated in the production of ephemeral harmful algal blooms (HABs), which are on the increase globally. Based on several case studies, a comprehensive coverage of the phycotoxins produced by HAB species (PSP, DSP, ASP, Ciguatera, NSP) is presented. The adverse effects of phycotoxins on human health, and the loss of revenues ($50 million in the USA) due to fish kills are evaluated. Latest advances in the methodology of genomics are presented with a view to highlight their importance and to understand their linkage with phycotoxin production. A discussion of remediation measures to manage HABs is presented, which would be highly useful in aquaculture operations.

This book provides a large number of illustrations, microphotographs and color photographs. It is ideal for any audience requiring an in-depth exposure to current issues, ideas and methods used in dinoflagellate studies. The topics discussed serve as a useful reference to researchers, scientists, environmental managers, undergraduate and graduate students.

**Marine Environments: Diversity, Threats and Conservation**

Lina Charles

In series: *Marine and Freshwater Biology*

Publication Date: 12/14/2020

519 pp.

Hardcover: 978-1-53618-874-5. $310.00
e-book: 978-1-53618-913-1. $310.00

Marine Environments: Diversity, Threats and Conservation presents important challenges and advances in the field of marine bioindicators in recent years, which could be relevant for integrative monitoring purposes and the development of new approaches and technologies in marine pollution monitoring.

The authors describe history of the development of organophosphorus pesticides, their behavior, current concentrations in marine environments, and effects on marine biota. The environmental behavior of organochlorine pesticides is reviewed, along with their effects on biota in global marine coastal environments, noting that these compounds are still detectable and potentially harmful.
In one study, stranded cetaceans and Pacific cods are used as indicator species to compare the contamination levels of radiocesium in three seas shortly after the Fukushima Daiichi Nuclear Power Plant Accident in 2011. A comparison between different extraction and detection techniques used for the determination of organic and inorganic pollutants in environmental matrices such as biota, water, and sediment is investigated. Additionally, the authors address the influence of plastic pollution on marine environments through continental water bodies.

The potential application of the UV/persulfate process for the degradation of emerging organic pollutants in seawater is discussed, using chlorazol black as a substrate model. The implications of atmospheric transport in the circulation of organochlorine pesticides are considered, presenting the relevance of atmospheric deposition to the oceans as a key process that affects marine environments. The penultimate chapter assesses the health of Black Sea fish species belonging to different ecological groups. In particular, the histopathological and biochemical biomarkers of the blood, spleen and liver are studied. In closing, the authors propose a Containerized Marine Knowledge System by means of IoT-Cloud and LoRaWAN to improve marine environment monitoring.

**United States Aquaculture and Fisheries**

*Vanessa R. McAndrew*

In series: *Marine and Freshwater Biology*

Publication Date: 11/04/2020

281 pp.

Hardcover: 978-1-53618-718-2. $195.00  
e-book: 978-1-53618-758-8. $195.00

Environmental organizations and fishermen generally have opposed development of offshore aquaculture. They assert that poorly regulated aquaculture development in inshore areas has degraded the environment and harmed wild fish populations and ecosystems. Those who oppose aquaculture development generally advocate for new authorities to regulate offshore aquaculture and to safeguard the environment and other uses of offshore waters. Some segments of the commercial fishing industry also have expressed concerns with potential development of aquaculture on fishing grounds and competition between cultured and wild products in domestic markets. This book looks at the issues dealing with offshore aquaculture and fisheries.

**Microbiology**

*An Essential Guide to Antimicrobial Agents*  
*Ernesto Macias*

In series: *Microbiology Research Advances*

Publication Date: 12/04/2020

195 pp.

Softcover: 978-1-53618-898-1. $95.00  
e-book: 978-1-53618-918-6. $95.00

Antimicrobial resistance has emerged as a global public health issue, as only a limited number of effective antibiotics are able to treat drug-resistant cases. As such, this compilation discusses the intensive non-clinical and clinical research on the identification of novel and non-conventional anti-infective adjunctive or preventive therapies. The authors review the mode of action of antimicrobial peptides and their therapeutic potential. Their complexity of molecules at the sequential and structural levels allow them to combat a wide variety of bacterial, viral, fungal and protozoan pathogens. Various solvent extracts from the stem of *Pongamia pinnata* L. are explored in the context of its antimicrobial activity against a wide array of pathogenic microorganisms. In closing, as silver nanoparticles can be more suitable in some bactericidal applications than silver ions, the efficacy of nanosilver as an antimicrobial agent against a range of microbes on the surface of water paints and cotton fabrics is studied.
Science and Technology

An Introduction to Microorganisms
Professor Qiang-Sheng Wu (College of Horticulture and Gardening, Yangtze University, Jingzhou, Hubei, China; Institute of Root Biology, Yangtze University, Jingzhou, Hubei, China), Ying-Ning Zou (College of Horticulture and Gardening, Yangtze University, Jingzhou, Hubei, China; Institute of Root Biology, Yangtze University, Jingzhou, Hubei, China), Dr. Fei Zhang (College of Biology and Agricultural Resources, Huanggang Normal College, Huanggang, Hubei, China) and Dr. Bo Shu (College of Horticulture and Gardening, Yangtze University, Jingzhou, Hubei, China)
In series: Microbiology Research Advances
Publication Date: 12/14/2020
291 pp.
Hardcover: 978-1-53618-872-1. $195.00
e-book: 978-1-53618-951-3. $195.00
Microorganisms include bacteria, actinomycetes, yeasts, molds, and viruses, among which bacteria are the most prevalent in nature, accounting for 90%-95% of microorganisms. Some microorganisms are visible to the naked eye, such as mushrooms, Ganoderma lucidum, etc. Other microorganisms are "acellular organisms" composed of a few components, such as nucleic acids and proteins. Microorganisms are tiny and closely related to humans, comprised of a variety of beneficial and harmful species. The new coronavirus (2019-nCoV) that broke out in 2019 is a large virus family that is highly infectious. The rapid spread of 2019-nCoV globally has made the public recognize the importance of microorganisms in medicine, as well as their involvement in food, industry, agriculture, environmental protection, sports and many other fields.
The present book revolves around the introduction to microorganisms and reviews relevant achievements in the field. The book is arranged in six important sections, including (i) quantitative optical microscopy in microbiology, (ii) introduction to important yeast genera in food biotechnology, (iii) nitrogen fixation and plant growth promotion by rhizobia with major emphasis on soybeans in Asia, (iv) endophytic fungus Piriformospora indica and its interaction with horticultural plants, (v) biodiversity of arbuscular mycorrhizal fungi in tropical Indonesia, and (vi) root rot and continuous cropping obstacles. This book provides important support for graduate students and researchers in the study of microorganisms while summarizing some new advances, particularly in rhizobia.

Microbes for a Sustainable Environment and Human Welfare: Advancements and Opportunities
Ronaldo Anuf Alexander (Department of Biotechnology Kamaraj College of Engineering and Technology Virudhunagar, Tamilnadu, India) and Vishnu Sankar Sivasankarapillai (Department of Chemistry, NSS Hindu College, Changanacherry, Kerala, India)
In series: Microbiology Research Advances
Publication Date: 01/13/2021
371 pp.
Hardcover: 978-1-53619-062-5. $230.00
e-book: 978-1-53619-120-2. $230.00
One of the major challenges faced by the world today is developing innovative and cost-effective bio-based technologies for sustaining a greener Earth, and the interactions between living beings are gaining renewed interest and value. This book describes advancements and opportunities for creating a sustainable environment for the welfare of humans with the help of microbes. Microbial activities are unique; their approaches can reduce stress on the environment, agricultural ecosystem, and soil biodiversity sustainability. A multidisciplinary view of microbial sustainability is presented in this book. Through the ten chapters, readers will find descriptions of various aspects of microbial-mediated environmental services and modern methodologies, including microbial-based bioremediation, treatment of industrial outpours, biosynthesis of nanoparticles, clean hydrogen production, therapeutics, biofuel production, and pharmaceutical applications. In terms of their physiology, metabolism and relevance as microbial models, microorganisms contribute to environmental, economic and industrial sustainability.
Major public health concern, caspase 3 role as the prominent executioner of apoptosis plays a central role as a key cellular component executioner of apoptosis. Complex regulatory mechanisms are required to coordinate timely and specific activation of caspase 3. As cancer continues to escalate as a major public health concern, caspase 3 role as the prominent executioner of apoptosis plays a central role as a key cellular mechanism of action. Caspase 3 is a key cysteine-aspartic protease that is largely known for its role in executing cell death or apoptosis. Caspases are a family of enzymes that play an important role in developing normal organ formation and function, maintaining homeostasis, and regulating cell death and inflammation. There are 14 known caspase enzymes in mammals, and 12 present in humans. Each caspase varies in purpose and mechanism of action.

A Closer Look at Proteolysis

Jelena Radosavljević (Assistant Professor, Department of Biochemistry, University of Belgrade- Faculty of Pharmacy, Belgrade, Serbia)

In series: Biochemistry and Molecular Biology in the Post Genomic Era

Publication Date: 10/16/2020

368 pp.

Hardcover: 978-1-53618-677-2, $230.00
e-book: 978-1-53618-743-4, $230.00

The book “A closer look at proteolysis” is conceived as a review of modern knowledge from various fields related to proteolytic processes. Due to the simple approach to explaining various aspects of the topics related to proteolysis, it will be of interest to a wide audience, as well for the scientific community. The first chapter provides an overview of basic concepts related to proteolysis, and the second chapter is devoted to the general classification of proteases that participate in the development of malignancy. The proteases that are perceived as potential candidates for the development of anticancer treatments are highlighted. The third chapter provides an insight into the basics of intracellular proteolysis, with an emphasis on proteolysis of the intrinsically disordered proteins and the consequences that proteolysis of these proteins has in plant cells particularly. In the fourth chapter, the authors provide the latest knowledge on the possibility of using a standard protease for mass spectrometry to determine post-translational modifications of proteins, which is the most recent challenge in proteomics-based research.

Although often used as therapeutics, peptides and proteins are susceptible to proteolysis under physiological conditions, so the design of drugs that mimic the action of proteins and peptides is a big challenge for medicinal chemists. In the fifth chapter, the authors elaborate on the ways to overcome proteolysis in potential therapeutic agents, using the rational design of modern peptidomimetics. The authors of the sixth chapter look at the correlation between the stability to proteolytic digestion and the allergenicity of food proteins. Chapters seven and eight are devoted to microbial proteases. The author of the seventh chapter gives an overview of the yeast proteases characterized so far, while the authors of the eighth chapter consider the possibilities for the production of purification of Bacillus proteases and their application in various biotechnological processes. In the last, ninth chapter, the technological significance of proteolytic processes in the food industry is emphasized. The authors presented methodologies that can be used to determine different bioactive peptides produced during cheese ripening.

Caspase-3: Structure, Functions and Interactions

Lunawati L. Bennett, PhD, PharmD (Professor of Pharmaceutical Sciences, Union University, College of Pharmacy, Jackson, Tennessee, USA)

In series: Biochemistry and Molecular Biology in the Post Genomic Era

Publication Date: 10/30/2020

169 pp.

Softcover: 978-1-53618-610-9, $95.00
e-book: 978-1-53618-686-4, $95.00

"Caspase 3: Structure, Functions and Interactions" is a book designed as an educational resource for researchers and health care providers who want to learn more about caspase 3. Physicians, pharmacists, other health care professionals can benefit from learning about the function of caspase 3 and its role in diseases and possible treatment options of using caspase 3-like compounds. New or seasoned scientists with research interests in caspases can learn novel ideas or interventions using caspase 3. Caspases are a family of enzymes that play an important role in developing normal organ formation and function, maintaining homeostasis, and regulating cell death and inflammation. There are 14 known caspase enzymes in mammals, and 12 present in humans. Each caspase varies in purpose and mechanism of action. Caspase-3 is a key cysteine-aspartic protease that is largely known for its role in executing cell death or apoptosis.

There are a total of 8 chapters in the book. Chapter 1 introduces the caspase family, their classification, regulation, and role in apoptosis. Chapter 2 discusses caspase-3 role in causing or preventing diseases such as cardiac, diabetes, and cancer. Chapter 3 highlights the emerging roles of caspase-3 in biological processes beyond cell death. Complex regulatory mechanisms are required to coordinate timely and specific activation of caspase 3. As cancer continues to escalate as a major public health concern, caspase 3 role as the prominent executioner of apoptosis plays a central role as a key cellular
protein as discussed in Chapter 4. Chapter 5 highlights our understanding on the activation of caspase 3/9 in starfish unfertilized eggs which elucidate the relationship of apoptosis in the vertebrates and nematodes. Chapter 6 discusses the interaction of caspase 3 with apoptotic peptide known as (KLAKLAK)2. Because of the cationic and amphipathic nature of (KLAKLAK)2, this peptide has the unique ability to cause the formation of apoptosome. Chapter 7 identifies caspase 3 role in central nervous system, aging, regeneration of neurons, and in Alzheimer’s, Parkinson’s, and other neurodegenerative diseases. Chapter 8 discusses biomarker and methods to detect caspase 3, and its interaction with different substrates and compounds.

Recent reputable books, journals, monograms, clinical trial results, and hands-on research data are used. This book was written by doctor of philosophy (PhDs) that are doing research in the field of caspase 3. We hope this book become a valuable resource for researchers and others who want to know more about caspase 3 structure, functions and interactions.

Zoology

Advances in Animal Science and Zoology. Volume 16
Owen P. Jenkins
In series: Advances in Animal Science and Zoology
Publication Date: 12/02/2020
243 pp.
Hardcover: 978-1-53618-713-7, $250.00
e-book: 978-1-53618-727-4, $250.00

Advances in Animal Science and Zoology. Volume 16 begins with a focus on entomopathogenic nematodes of the families Steinernematidae and Heterorhabditidae, which can be used successfully to control a wide range of agricultural insect pests. Following this, the authors discuss the potential use of silver nanoparticles for the control of mosquito vectors and other coinhabiting species. The green synthesis of these nanoparticles, along with spectroscopic and microscopic techniques employed for primary and secondary phase measurements, is considered at length. The metathoracic flight apparatus of the honey bee Apis mellifera is discussed, representing a highly specialized system for turning manoeuvres which is capable of generating unilateral modifications of the aerodynamic effect of the whole double-wing.

Novel advancements in regenerative engineering utilizing various biomaterials and engineering techniques are discussed, offering a hopeful outlook for patients with severe urologic dysfunction or damage with limited options. The authors explore how gases produced through the fermentation of feedstuffs may be screened and analyzed to assess the production and emission of greenhouse gases related to their consumption and degradation. The concluding study aims to identify the defoliating fall armyworm of the genus Spodoptera and assess the severity of damage they cause to maize plants in the municipality of Djougou in northern Benin.

MATHEMATICS AND STATISTICS

Algebra

Introduction to Clifford Algebra
Johan Ceballos (Universidad de Las Américas. Quito, Ecuador), Nicolás Coloma (University of Colorado Boulder, Co, USA), Antonio Di Teodoro (Universidad San Francisco de Quito, Quito, Ecuador) and Francisco Ponce (Universidad San Francisco de Quito, Quito, Ecuador)
In series: Mathematics Research Developments
Publication Date: 10/30/2020
182 pp.
Softcover: 978-1-53618-533-1, $95.00
e-book: 978-1-53618-664-2, $95.00

This book pursues to exhibit how we can construct a Clifford type algebra from the classical one. The basic idea of these lecture notes is to show how to calculate fundamental solutions to either first–order differential operators of the form

$$D = \sum_{i=0}^{n} e_i \delta_i$$

for second–order elliptic differential operators’ D D, both with constant coefficients or combinations of this kind of operators. After considering in detail how to find the fundamental solution we study the problem of integral representations in a classical Clifford algebra and in a dependent–parameter
Clifford algebra which generalizes the classical one. We also propose a basic method to extend the order of the operator, for instance $D^n,n\in\mathbb{N}$ and how to produce integral representations for higher order operators and mixtures of them. Although the Clifford algebras have produced many applications concerning boundary value problems, initial value problems, mathematical physics, quantum chemistry, among others; in this book we do not discuss these topics as they are better discussed in other courses. Researchers and practitioners will find this book very useful as a source book. The reader is expected to have basic knowledge of partial differential equations and complex analysis. When planning and writing these lecture notes, we had in mind that they would be used as a resource by mathematics students interested in understanding how we can combine partial differential equations and Clifford analysis to find integral representations. This in turn would allow them to solve boundary value problems and initial value problems. To this end, proofs have been described in rigorous detail and we have included numerous worked examples. On the other hand, exercises have not been included.

Data Analysis

**Introduction and Comparison of Data Envelopment Analysis Software Packages**

Ali Reza Alinezhad, PhD (Associate Professor, Department of Industrial Engineering, Islamic Azad University, Qazvin Branch, Iran), Seyyed Hamed Mirtaleb (Department of Industrial Engineering, Faculty of Industrial and Mechanical Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran) and Javad Khalili (Department of Industrial Engineering, Faculty of Industrial and Mechanical Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran)

In series: Mathematics Research Developments
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306 pp.

Hardcover: 978-1-53619-119-6. $230.00

This book presents and compares 11 software packages of Data Envelopment Analysis (DEA). Performance measurement is done by various methods, one of which is DEA. Due to the ability of DEA models to meet practical requirements, extensive research can be conducted in the fields of mathematics, management, economics, and engineering. Therefore, during recent decades, the use of this method has been considered with significant growth among researchers. DEA evaluates the performance of Decision Making Units (DMUs) by using linear programming. Since linear programming should be solved for each DMU, performance measurement for a large number of DMUs is difficult and time-consuming. For this purpose, various software packages have been designed and developed to address these problems. Each of these software's is designed for different purposes and has different features and applications. The main objectives of this book are to introduce, express the advantages and disadvantages of each of these software packages, as well as their comparisons.

Geometry and Topology

**Hilbert Spaces and Its Applications**

Michael Argyros (Department of Computing and Technology, Cameron University, Lawton, Oklahoma, USA), Ioannis K. Argyros (Department of Mathematical Sciences, Cameron University, Lawton, Oklahoma, USA) and Samundra Regmi (Department of Mathematical Sciences, Cameron University, Lawton, Oklahoma, USA)

In series: Mathematics Research Developments
Publication Date: 02/05/2021
244 pp.

Hardcover: 978-1-53618-983-4. $195.00

This book contains numerous selected contemporary topics, primarily in Hilbert space, although related extended material in Banach spaces and Riemannian manifolds is also included.
A plethora of concrete problems from diverse disciplines are explored, such as: applied mathematics; mathematical biology; chemistry; economics; physics; scientific computing, and engineering. The solutions of such equations can only be found in closed form in special cases; this forces researchers and practitioners to focus on the development of iterative methods to generate a sequence converging to the solutions, provided that some convergence criteria depending on the initial data are satisfied. Due to the exponential development of technology, new iterative methods should be found to improve existing computers and create faster and more efficient ones. We have no doubt that this book will contribute significantly to the enrichment of knowledge and problem solving in the field of Hilbert spaces and related topics.

**Understanding Quaternions**

Peng Du (School of Marine Science and Technology, Northwestern Polytechnical University, Xi’an, China), Haibao Hu (School of Marine Science and Technology, Northwestern Polytechnical University, Xi’an, China), Dong Ding (Roberval Laboratory, University of Technology of Compiègne, France) and Zhuoyue Li (School of Marine Science and Technology, Northwestern Polytechnical University, China)

In series: Mathematics Research Developments
Publication Date: 10/09/2020
197 pp.
Softcover: 978-1-53618-343-6. $95.00
e-book: 978-1-53618-533-9. $95.00

Quaternions are members of a noncommutative division algebra first invented by William Rowan Hamilton. They form an interesting algebra where each object contains 4 scalar variables, instead of Euler angles, which is useful to overcome the gimbal lock phenomenon when treating the rotation of objects. This book is about the mathematical basics and applications of quaternions. The first four chapters mainly concern the mathematical theories, while the latter three chapters are related with three application aspects. It is expected to provide useful clues for researchers and engineers in the related area. In detail, this book is organized as follows: In Chapter 1, mathematical basics including the quaternion algebra and operations with quaternions, as well as the relationships of quaternions with other mathematical parameters and representations are demonstrated. In Chapter 2, how quaternions are formulated in Clifford Algebra, how it is used in explaining rotation group in symplectic vector space and parallel transformation in holonomic dynamics are presented. In Chapter 3, the wave equation for a spin 3/2 particle, described by 16-component vector-bispinor, is investigated in spherical coordinates. In Chapter 4, hyperbolic Lobachevsky and spherical Riemann models, parameterized coordinates with spherical and cylindric symmetry are studied. In Chapter 5, ship hydrodynamics with allowance of trim and sinkage is investigated and validated with experiments. In Chapter 6, the ballast flying phenomenon based on Discrete Discontinuous Analysis is presented. In Chapter 7, a numerical study is proposed to analyze the effect of the caisson sliding subjected to a hydrodynamic loading in the stability of the rear side of the rubble mound breakwater.

**Special Topics**

**A Closer Look at the Diffusion Equation**

Jordan Hristov, PhD, DSc (Professor of Chemical Engineering, Department of Chemical Engineering, University of Chemical Technology and Metallurgy, Sofia, Bulgaria)

In series: Mathematics Research Developments
Publication Date: 10/09/2020
189 pp.
Softcover: 978-1-53618-330-6. $95.00
e-book: 978-1-53618-488-4. $95.00

Diffusion is a principle transport mechanism emerging widely at different scale, from nano to micro and macro levels. This is a contributed book of seventh chapters encompassing local and no-local diffusion phenomena modelled with integer-order (local) and non-local operators. This book collates research results developed by scientists from different countries but with common research interest in modelling of diffusion problems. The results reported encompass diffusion problems related to efficient numerical modelling, hypersonic flows, approximate analytical solutions of solvent diffusion in polymers and wetting of soils. Some chapters are devoted to fractional diffusion problem with operators with singular and non-singular memory kernels.
The book content cannot present the entire rich area of problems related to modelling of diffusion phenomena but allow seeing some new trends and approaches in the modelling technologies. In this context, the fractional models with singular and non-singular kernels the numerical methods and the development of the integration techniques related to the integral-balance approach form fresh fluxes of ideas to this classical engineering area of research.

The book is oriented to researchers; master and PhD students involved in diffusion problems with a variety of application and could serves as a rich reference source and a collection of texts provoking new ideas.

**Advances in Mathematics Research. Volume 28**

*Albert R. Baswell*

In series: *Advances in Mathematics Research*

Publication Date: 09/02/2020

216 pp.

Hardcover: 978-1-53618-251-4, $250.00

e-book: 978-1-53618-287-3, $250.00

This compilation first outlines a stochastic multicriteria modelling-to-generate-alternatives approach for waste management planning that can generate maximally different sets using a modified version of the computationally efficient Firefly Algorithm. The authors present reduced-order models to pattern formations occurring in the activator-inhibitor FitzHugh-Nagumo equation, parametrized Allen-Cahn equation, non-linear Schrödinger equation, Ginzburg-Landau equation and Swift-Hohenberg equation. The subsequent chapter deals with the singularly perturbed semilinear convection-diffusion problem, serving as an introduction to the model problems which arise frequently in counterflow flames modeling, modeling in mathematical biology, semiconductor device simulations based on the so-called drift diffusion modeling, fluid dynamics and heat conduction.

The authors present linear integer programming approach to construct efficient incomplete block designs forgiven v, b and k. The proposed approach is illustrated by constructing an A-efficient incomplete block design, and the strengths and weaknesses of this algorithm are also discussed.

One included work is devoted to the issue of the Green functions that are related to some three-point boundary and eigenvalue problems. A detailed definition is given for the Green functions provided that the considered three-point boundary value problems are governed by a class of ordinary differential equations which are associated with homogeneous boundary and continuity conditions.

A review on the methods of mathematical modeling used to calculate irreversible loss of capacity in polymer lithium-ion batteries is provided.

In closing, the authors consider the corpus of mathematical theorems that admit formulations in natural language and offer some explanations of the existence of several types of theorems.

**An Introduction to the Extended Kalman Filter**

*Matthias Holland*

In series: *Mathematics Research Developments*

Publication Date: 11/20/2020

115 pp.

Softcover: 978-1-53618-875-2, $82.00

e-book: 978-1-53618-884-4, $82.00

An Introduction to the Extended Kalman Filter first presents a study wherein a two-stage approach for the estimation of a spacecraft’s position and velocity using single station antenna tracking data is proposed. Since the Kalman filter and its variants are widely used for estimation in diverse domains, the authors also present a review of fault detection, diagnosis and fault tolerant control of descriptor/differential algebraic equation systems specifically focused on the Kalman filter and its variants.

The closing contribution provides insight into the intrinsic convergence of the extended Kalman filter when operated in the stochastic frame for the class of systems and outputs considered.
Recent Studies in Differential Equations
Henry Forster
In series: Mathematics Research Developments
Publication Date: 10/02/2020
130 pp.
Softcover: 978-1-53618-389-4. $82.00
e-book: 978-1-53618-429-7. $82.00
This compilation introduces and studies the class of (asymptotically) Stepanov almost automorphic functions with variable exponents, presenting a few relevant applications of abstract Volterra integro-differential inclusions in Banach spaces. The authors study the existence and regularity of solutions for some nonlinear second order differential equations, showing the existence of mild solutions and giving sufficient conditions ensuring the existence of strict solutions. Sufficient conditions for the oscillation of solutions of neutral impulsive differential equations are also presented. In the penultimate study, the oscillatory behaviour of the solutions of a class of nonlinear first-order neutral differential equations with several delays of one form are studied. In addition, some sufficient conditions for the oscillation of solutions to the first and second-order neutral delay difference equation are presented.

Physics and Astronomy

Astronomy and Astrophysics

An Introduction to Magnetometers
Dr. Zolile Mtumela, PhD (Lecturer, School of Chemistry and Physics, University of Kwa-Zulu Natal, South Africa) and Dr. Thembinkosi Donald Malevu, PhD (Lecturer, School of Chemistry and Physics, University of Kwa-Zulu Natal, South Africa)
In series: Space Science, Exploration and Policies
Publication Date: 12/14/2020
282 pp.
Hardcover: 978-1-53618-756-4. $195.00
Ground magnetometer observations have played a major role in the development of space science, by remotely measuring currents that define the dynamics of the magnetosphere and Earth’s ionosphere. They have led to the identification of ionospheric currents associated with magnetic substorms and storms, as well as those associated with global compressions of the magnetosphere from interplanetary shocks and bow shock-related instabilities. Ground magnetometer observations have made it possible to track and comprehend the way reconfigurations of currents and convection are propagated globally after the magnetosphere is impacted by solar wind and/or interplanetary magnetic field dynamics. Global ground magnetometer observations provide the most fundamental and necessary context that needs to exist if any of the current and future missions are to provide new discovery science within the Near-Earth Environment. While their role as a continuous monitor and context-providing source is paramount, their continuous operation on a now-global scale provides the means for research science at the systems. The above overview of the magnetometers on space-based magnetometers are by no means intended to be complete, but is to illustrate the historic success of magnetometers and the contributions to our understanding of space physics and related fields.
An Introduction to Molecular Clouds
Sachin Kaathekar (Associate Professor, Department of Engineering Physics, Mahakal Institute of Technology & Management, Ujjain, Madhya Pradesh, India)

In series: Advances in Astronomy and Astrophysics
Publication Date: 03/11/2021
120 pp.
Softcover: 978-1-53619-178-3. $82.00
e-book: 978-1-53619-353-4. $82.00

An Introduction to Molecular Clouds describes the formation of molecular clouds and the innovative features of molecular clouds with different physical parameters. In this book, gravitational instability is discussed with different physical parameters, which is the major cause of the formation of molecular clouds in the interstellar medium (ISM), and the way molecular clouds are formed in the astrophysical plasma environment is described. The authors aim to determine the basic conditions responsible for the formation of heavenly bodies in the universe. The book deals with radiative instability in a variety of conditions incorporating different physical parameters such as viscosity, rotation, permeability, porosity, thermal conductivity, Hall current, Finite ion Larmor radius corrections, finite electrical resistivity, radiative heat-loss functions and finite electron inertia, both in gaseous plasma and quantum plasma environments.

Solar Irradiance: Types and Applications
Daryl M. Welsh

In series: Advances in Astronomy and Astrophysics
Publication Date: 11/06/2020
148 pp.
Softcover: 978-1-53618-786-1. $82.00
e-book: 978-1-53618-799-1. $82.00

Solar Irradiance: Types and Applications first presents intelligent models for sizing, parameters forecasting and control of a photovoltaic system on the basis of a modified fuzzy neural net. The modified fuzzy neural net provides automatic fulfillment and modification of all proposed intelligent models. Following this, the authors discuss modeling direct normal irradiance at the Earth’s surface. In addition to looking traditionally at direct normal irradiance as a fuel for concentrating solar systems, its use in computing the sunshine number is also explored. The closing study explores the potential of using simple empirical and artificial neural network models to estimate global solar radiation on a horizontal surface. Algeria was used as a case study and four statistical parameters were chosen to assess the performances of each model or approach.

Classical and Fluid Mechanics

An Introduction to Surface Tension
Jürgen Klein

In series: Physics Research and Technology
Publication Date: 09/18/2020
182 pp.
Softcover: 978-1-53618-378-8. $95.00
e-book: 978-1-53618-476-1. $95.00

The term “surface tension” reflects the nature of intermolecular forces in neighboring liquid and vapor phases. Surface tension decreases with increasing temperature, and drops to zero value at critical temperature. To a small extent, it is influenced by pressure and the interface curvature. An Introduction to Surface Tension discusses the possibility of a significant use of surfactants, polymers, alkali and microbes for surface tension alteration based on work done in the last decades, with new insight on the chemical aspects, especially for gas recovery from shale by altering surface tension.

In closing, the authors propose a model based on the concept that surfactant and polymer molecules rotate during the process reaching the equilibrium surface state, which is different from the conventional adsorption theory.
Nuclear and High Energy Physics

**Computational Methods in Nuclear Radiation Shielding and Dosimetry**

Kulwinder Singh Mann, PhD (Assistant Professor, Department of Physics, D.A.V. College Bathinda, Punjab, India) and V. P. Singh, PhD (Department of Physics, Karnatak University, Dharwad, India)

In series: Physics Research and Technology

Publication Date: 10/09/2020

375 pp.

Hardcover: 978-1-53618-527-0. $230.00

e-book: 978-1-53618-661-1. $230.00

This book is a compilation of the most widely used computational methods and techniques for calculating shielding parameters that are required for radiation-shielding investigations of dosimetric materials. The theoretical, experimental, and simulation methods and their applications are described. The book is divided into thirteen chapters that are arranged in a systematic order and written by experienced scientists and academicians worldwide. The gamma-ray shielding parameter calculations with the Monte Carlo simulation techniques viz. MCNP, GEANT4, FLUKA, and EGS5 codes are illustrated. Descriptions of various software such as XCOM, WinXCom, FLUKA, Phy-X, BMIX, ASFI, and ANSI are provided. A review of fundamental quantities for calculation of ambient dose, i.e., photon and neutron buildup factors, is presented. A phantom-based computation model has been included to indicate the applications of radiation dosimetry in medical diagnostics. The chapters on computed-tomography (CT) have been included to provide insight into the radiations’ diagnostic capabilities and applications. The shielding effectiveness of some materials such as ignimbrite rocks, amorphous metals, marbles, dosimetric materials, and novel shielding materials have been investigated. The most recent concept of multi-layered shielding and related buildup factors’ influence on the shielding effectiveness is described with a computer program, the RIMP-TOOLKIT. This book is the result of the authors’ hard-work and determination during the worldwide lockdown period caused by the spread of COVID-19. The conclusions presented in this book will be useful in nuclear radiation shielding and for dosimetric purposes. Additionally, this book will be helpful for postgraduate students of physics and chemistry.

Particle Physics

**Neutrinos: Beyond the Basics**

Neil A. Stewart

In series: Physics Research and Technology

Publication Date: 12/04/2020

179 pp.

Softcover: 978-1-53618-678-9. $95.00

e-book: 978-1-53618-950-6. $95.00

In this compilation, the authors first investigate the potential use of mineral lorandite from Allchar to estimate the Sun’s age. A brief history of the discovery of neutrinos is provided, focusing on properties such as electrical charge, mass, and sources. A brief introduction to neutrinos in the standard model of particle physics is also provided, followed by neutrino oscillations both in vacuum and in matter. Special experiments involving neutrino beams generated by accelerators are planned to study the properties of neutrinos on long baselines. Lastly, within the context of a U(1)B−L minimal model, the authors discuss the effects of the anomalous magnetic moment and electric dipole moment of the tau-neutrino on stellar energy loss rates through the process of pair-annihilation.
A Comprehensive Guide to Superconductivity
Rohan Morrow
In series: Physics Research and Technology
Publication Date: 12/08/2020
253 pp.
Hardcover: 978-1-53618-901-8, $160.00
e-book: 978-1-53618-995-7, $160.00
A Comprehensive Guide to Superconductivity discusses the societal and environmental benefits of superconducting devices in electric transportation systems, introducing the electric and thermal characteristics of superconducting devices as well as providing an analysis of their cryogenic systems. The authors describe the main principles of spectroscopic methodology for the analysis of gapped electronic spectra and the electron-boson interaction leading to Cooper pair formation and, in turn, Fermi-sea instability. Additionally, methods to optimize the design of a 2G AC power cable are presented with the goal of providing uniform current distribution among cable layers. Beginning with an introduction to Pauli limited superconducting systems, solid state and ultra cold atomic gas setups which host the Fulde-Ferrell-Larkin-Ovchinniko superconducting phase are studied, along with relevant experimental diagnostics and reported observations. In closing, the authors discuss the theoretical understanding of Josephson transport in hybrid superconductor quantum dot devices. In particular, Josephson transport is studied through an uncorrelated single-level quantum dot coupled between two Bardeen-Cooper-Schrieffer superconducting leads, modeled by single-impurity Anderson Hamiltonian.

A Guide to Laser-Induced Breakdown Spectroscopy
Pablo A. Foster
In series: Physics Research and Technology
Publication Date: 12/11/2020
173 pp.
Softcover: 978-1-53618-932-2, $95.00
e-book: 978-1-53618-994-0, $95.00
This compilation focuses on laser-induced breakdown spectroscopy, a technique that provides a versatile qualitative and quantitative analysis of any sample. The authors present perspectives on the current trends in the use of laser-induced breakdown spectroscopy for insulation condition monitoring. A guide to laser-induced breakdown spectroscopy as a classification tool is provided, along with combinations of well-established classification algorithms with laser-induced breakdown spectroscopy and their implementation schemes.

Acoustic Waves: Properties and Measurement
Lucas S. Lorenzen
In series: Physics Research and Technology
Publication Date: 09/18/2020
185 pp.
Softcover: 978-1-53618-405-1, $95.00
e-book: 978-1-53618-425-9, $95.00
Acoustic signal analysis is commonly used for non-invasive pipeline condition assessment and diagnosis. Considering that pipeline systems are made of different materials ranging from steel to polymers, the analysis method is also contingent on the vibroacoustic properties of the pipe wall material. In this compilation, an adaptive, locally defined time marching technique is presented to analyze wave propagation models. The methodology is based on two time integration parameters, namely α and γ. Additionally, the authors present recent improvements in acoustic impedance methods to describe the transduction and propagation of guided elastic waves in MEMS devices electrostatically actuated through thin air-gaps. The closing study focuses on the way in which the Lorentz force acting on a continuous medium from the side of the magnetic field has a significant effect on the behavior of magnetoacoustic waves.
**Auto Oscillations of Flow Inhomogeneities**

Dr. Andrey (Andrew) G. Semenov (Senior Research Scientist of Academician N.N. Andreev Acoustics Institute of RAS, Moscow, Russia)

In series: Physics Research and Technology

Publication Date: 12/14/2020

404 pp.

Hardcover: 978-1-53618-696-3. $310.00
e-book: 978-1-53618-723-6, $310.00

The book provides the analysis and research results related to flow inhomogeneities auto oscillations observed in free subsonic and supersonic jet flow as well as during jet flow interaction with adjacent bodies, acoustic resonators, ejectors and valves. It demonstrates the laws, relationships and experimental evidences for various auto oscillations phenomena directly related to incident flow regimes based on conditions of flow boundary instability and feed back mechanism realized by corresponding sound field radiated due to periodic hydrodynamic disturbances reflection propagating in opposite to flow direction in the form of sound impulses exciting flow origin. Book results allow devoting particular attention to auto oscillations condition prediction and in a sense to their control. Book is addressed to physicists, acousticians and hydrodynamics engineers developing low noise and vibration aircrafts, ships and space vehicles with aid of adjacent flow and jet flow auto oscillations cancellation as well as to specialists involved in flow induced auto oscillations sound sources efficiency increase research, say, related to musical instruments or to biological research of man and animal voice properties. Book will be useful as well to undergraduate and graduate students of these specialties.

**Horizons in World Physics. Volume 304**

Albert Reimer

In series: Horizons in World Physics

Publication Date: 09/18/2020

223 pp.

Hardcover: 978-1-53618-440-2. $250.00
e-book: 978-1-53618-491-4, $250.00

In this compilation, the authors describe a volume source of negative hydrogen ions on the basis of Penning ionization gauge with a metal hydride cathode, which plays the role of a cathode and the solid-state generator of working gas. Next, a study is carried out in two cases of constant and variable charges of dust grains. Consideration of the dust charge variation requires the evaluation of charging currents. The possibilities of ultra short pulsed laser deposition for modified scratch-resistant surfaces in industrial and optical applications are demonstrated and reviewed. Additionally, results of investigations on new types of silicon p-n junction diodes are presented. As temperature sensors, these types of silicon don’t have the disadvantages inherent to usual commercial devices when they are employed at low temperatures and in the presence of magnetic fields.

In the subsequent study, it is found that all bodies are characterized by a neutrino halo which is formed by an equilibrium interaction between the surrounding neutrinos and the neutrino field of the atomic nuclei from the object. The authors match an exterior solution of a spherically symmetric wormhole to the general interior vacuum solution with specific values of the arbitrary function at the junction interface, thus determining the surface stresses on the thin shell. In closing, the Becchi-Rouet-Stora-Tyutin and anti-Becchi-Rouet-Stora-Tyutin symmetries of gauge theories are recapitulated. This symmetry plays an important role in proving the unitarity and renormalizability of these theories.

**Phosphors for Display, Forensic and Biomedical Application**

Vikas Dubey (Asst. Dean Research and Development, Department of Physics, Bhilai Institute of Technology Raipur, Kendri, India), Marta Michalska-Domańska (Institute of Optoelectronics, Military University of Technology, Warsaw, Poland), Neha Dubey (Department of Physics, Govt. V.Y.T.PG. Auto. College Durg, Chhatisgarh, India) and Jagjeet Kaur Saluja (Department of Physics, Govt. V.Y.T. PG. Autonomous College, Durg, India)

In series: Physics Research and Technology

Publication Date: 02/05/2021

327 pp.

Hardcover: 978-1-53619-937-7, $230.00
e-book: 978-1-53619-156-1. $230.00
The demand for phosphors with advanced performance capabilities is increasing due to recent technical developments in
the display, lighting, and fluorescence labeling sectors. Rare-earth doped phosphors have been the focus of the research
community, owing to their widespread applications in display devices, temperature sensors, solar cells, etc. This book
reviews the broad aspects of organic and inorganic materials-based phosphors, and will be beneficial to undergraduate,
graduate, and postgraduate students. It provides an up-to-date account of the advancement of various techniques for the
synthesis of phosphors and their applications. Experimental and theoretical approaches related to the rare-earth-doped
luminescent materials are explored.

Space Magnetic Traps in the Universe and in Magnetosphere
Lev I. Dorman (Israel Cosmic Ray and Israeli-Italian Emilio Segre' Observatory on Mt. Hermon, Tel Aviv University, Golan Research Institute, and Israel Space Agency, ISRAEL)

In series: Classical and Quantum Mechanics
Publication Date: 09/18/2020
610 pp.
Hardcover: 978-1-53618-322-1, $315.00
e-book: 978-1-53618-419-8, $315.00

The importance and actuality of investigation Space Magnetic Traps in the Universe and in Magnetosphere are based on following four factors:
1. Space Magnetic Traps in the Universe for Cosmic Ray particles (Astroparticles, Run Away Particles) on different studies of the Universe’s evolution and in different objects (galaxies of different types, quasars, nucleus of galaxies, Sun and stars, Heliosphere and Stellar Spheres, solar and stellar winds, magnetospheres of planets, and so on) are very interested and important in the frame of fundamental science (Astrophysics, Plasma Physics and Magneto-Hydrodynamics, Nuclear and Elementary Particle Physics, Geophysics). This problem is interested also for applications (e.g., problem of controlled thermo-nuclear reactions in magneto-plasmas traps as main source for energy in near future for the Earth’s Civilization).

2. The Magnetosphere is the nearest giant natural laboratory where with satellites and ground measurements is possible to investigate different plasmas and energetic processes in space caused by interaction of high kinetic energy solar wind plasmas with frozen in Interplanetary Magnetic Fields-IMF and its perturbations (Interplanetary Coronal Mass Ejections-ICMEs, Interplanetary Shock Waves-ISWs, Interplanetary Interaction Regions-IIRs, and so on) with the rotated main geomagnetic field. This interaction leads to a dynamic transformation of magnetic fields in the Magnetosphere, formation Space Magnetic Traps (Radiation Belts), generation and trapping of high energy particles (which can be called Magnetospheric Cosmic Rays-MCR), and generation of different types of instabilities and electromagnetic radiations. These processes are similar to processes in magnetospheres of other planets and their moons, in the atmosphere of the Sun and other stars, in interplanetary and in interstellar space, and in many different astrophysical objects in the Universe. This research presents an important basis for fundamental space in frame of Astrophysics, Plasma Physics and Magneto-Hydrodynamics, Nuclear and Elementary Particle Physics, Geophysics.

3. In modern time, technology, economics, navigation, TV, internet, radio-connections, military aspects, and the life of people on our planet are strongly connected by the work of many satellites moving inside the Magnetosphere. Different processes and MCR in the magnetosphere influence how the satellites work and often lead to satellite malfunctions, sometimes completely destroying their electronics and satellites become ‘dead’. The described research can be considered as a basis for developing methods of forecasting dangerous situations for satellites on different orbits and to decrease the risk of satellite malfunctions and of losing them. It means that this research has important practical applications.

4. The interaction of ICME, ISW, and IIR with the Magnetosphere leads to the generation of big magnetic storms accompanied by Cosmic Ray Forbush-decrease and precursory effects in Galactic Cosmic Ray (GCR) intensity. These magnetic storms are dangerous, not only for satellites, but also for Earth’s surface regarding technology, radio-connections, car accidents, and human health (e.g., increasing frequency of infarct myocardial and brain strokes). Investigation of causes of magnetic storms can help to develop methods of their forecasting and decrease the level of magnetic storm hazards. Therefore, the other practical application of this research is connected with the problem of space weather and space climate influence on the technology, radio-connections, navigation, transportation, and human health on the Earth in dependence of altitude and geomagnetic latitude.
The Fundamentals of Polarized Light
Alan Terry
In series: Physics Research and Technology
Publication Date: 01/27/2021
211 pp.
Hardcover: 978-1-53618-977-3. $160.00
e-book: 978-1-53619-090-8. $160.00
This compilation opens with a discussion of the limitations of the current enamel birefringence interpretation and its potential applications in various fields, such as: caries research, forensic dentistry, anthropology, paleontology, and evolutionary biology.
The authors demonstrate a novel concept for the reproduction of the “movement without frame-by-frame display technique” developed by the Lumiere brothers in 1895 in their cinematograph motion picture system.
The current evidence base surrounding the use of both monochromatic and polychromatic polarized photobiomodulation is reviewed, specifically related to wound healing and musculoskeletal conditions.
Following this, to induce molecular orientations such as the symmetry operation of crystals, the authors study circularly or linearly polarized UV light irradiation in hybrid materials.
New chiral Schiff base metal Ni(II) and Zn(II) complexes containing an azobenzene moiety in ligands are synthesized, in which substituents (H, Cl) at the ortho position of azobenzene are introduced for wavelength-selective molecular orientation by light irradiation.
In closing, the authors design new metal complexes with a rigid Y-shaped structure with a photosomerization moiety aligned by polarized UV light and expected to cause the Weigert effect.

Thermal Physics and Statistical Mechanics

A Closer Look at Convective Heat Transfer
Liang-Bi Wang (Professor, Director of Key Laboratory of Ministry of Education of China for Railway Vehicle Thermal Engineering, Lanzhou Jiaotong University, China)
In series: Physics Research and Technology
Publication Date: 03/04/2021
353 pp.
Hardcover: 978-1-53619-041-0. $230.00
e-book: 978-1-53619-244-5. $230.00
Convective heat transfer plays a role in many branches of science and engineering, as well as in aspects of daily life. Due to its importance, it deserves to be given a closer look.
This book shows some real complexities of convective heat transfer in more rigorous ways, with most aspects described by partial differential equations. Defined by Fourier’s law, heat flux is transported by convection. Thus, the transport of heat flux can be described using the convective transport equation of the heat flux, which may provide more information. The significance of this description is that the velocity gradient’s contribution to the transport of heat flux is stated implicitly and may be connected to the mechanical dissipation.
A description of the transport of the momentum flux is provided in this book, focusing on both the mechanical energy prepared by production from the main flow and the mechanical energy dissipated by vorticity. Based on the convective transport equations of heat flux and momentum flux, a correlation between the contribution to the transport of heat flux and mechanical energy production and dissipation is established.
Additional topics discussed herein include the transport characteristics of heat flux, the impact of velocity and its gradients on the transport of heat flux in a channel flow, a tube flow, a channel flow with vortex generators and a twisted elliptical tube flow. As secondary flow and vorticity are commonly used for the enhancement of convective heat transfer, the roles of secondary flow and vorticity in the convective transport of heat flux are discussed.
The intensity of convective heat transfer is only defined by the surface which heat is transferred through; it is not defined in the fluid region. Combustion science, oceanography, meteorology, and geoscience pay much attention to local convective heat transfer intensity. This book verifies the rationality of local convective heat transfer intensity.
Understanding Heat Conduction
William Kelley
In series: Physics Research and Technology
Publication Date: 01/29/2021
180 pp.
Softcover: 978-1-53619-182-0, $95.00
e-book: 978-1-53619-202-5, $95.00
The first chapter of this book proposes an analytical Fourier series solution to the equation for heat transfer by conduction in a spherical shell with an internal stone consisting of insulating material as a model for the kinetic of temperature in stone fruits both as a general solution and a mass average value. The chapter also considers an internal heat source linearly reliant on temperature. The second chapter focuses on the sensitivity of the numerical modeling technique for conjugate heat transfer involving high-speed compressible flow over a cylinder. The last chapter presents an overview of the fundamental solution (FS) based finite element method (FEM) and its application in heat conduction problems. First, basic formulations of FS-FEM are presented, such as the nonconforming intra-element field, auxiliary conforming frame field, modified variational principle, and stiffness equation. Then, the FS-FE formulation for heat conduction problems in cellular solids with circular holes, functionally graded materials, and natural-hemp-fiber-filled cement composites are described.

Technology and Engineering
Construction
Recent Advances in Welding
Francisco José Gomes da Silva (ISEP – School of Engineering, Polytechnic of Porto, Department of Mechanical Engineering, Porto, Portugal) and António Manuel de Bastos Pereira (Universidade de Aveiro, Departamento de Engenharia Mecânica, Centro de Tecnologia, Mecânica e Automação Campo Universitário de Santiago, Averio, Portugal)
In series: Construction Materials and Engineering
Publication Date: 10/01/2020
383 pp.
Hardcover: 978-1-53618-342-9, $230.00
e-book: 978-1-53618-627-7, $230.00
Welding is a conventional joining process that has followed the recent developments in other manufacturing processes, continuing to be an extremely used and investigated process. Although some techniques have been implemented and studied for several decades, the interest of researchers in welding has not diminished, as it can be seen through new processes that have emerged, such as Friction Stir Welding, in addition to many other notable developments in welding processes which apparently seemed to have reached their final stage of maturity. This work brings together a set of very interesting works, being a living proof that welding continues to be heavily investigated and that the developments around this manufacturing process are constantly emerging. Because the materials continue to evolve and the technology around welding also continues to develop at a very good pace, studies on the weldability of new materials and the application of new techniques and technologies to already well known welding processes does not stop happening. The editors are proud to have collected this set of works that can help scholars and researchers to broaden their knowledge in the field of welding, thus contributing to the creation of a knowledge base that allows researchers to start new investigations and achievements in the coming decades.
Electrical Engineering

Phase-Locked Loops: Structure, Functions and Applications
Shambhu N. Sharma, PhD (Head, Electrical Engineering Department and Former Associate Dean Academic, National Institute of Technology, Surat, India)

In series: Electrical Engineering Developments
Publication Date: 09/02/2020
345 pp.
Hardcover: 978-1-53618-338-2, $230.00
e-book: 978-1-53618-490-7, $230.00

The historic account of the Phase-Locked Loops can be traced back from the idea of designing an electromechanical system with the objective of controlling the oscillation of the pendulum of the bell Great George. The method is to contrast the phase of pendulum and the incoming telegraph signal phase using the electromechanical system. That generates the correction signal varying the pendulum oscillation. The idea was conceived as well as implemented by David Robertson, Professor of Electrical Engineering at the University of Bristol. The term Phase-Locked Loop was coined to this technique by later Researchers in 1932. Professor David Robertson is credited to the Phase-Locked Loop for pioneering the technique. In general setting, the Phase-Locked Loops are for synchronization purposes. The phase locked loops perspective hinges on the analysis, functions and applications.

Energy

Michail Chalaris, MA, PhD (Department of Chemistry, International Hellenic University, and Hellenic Fire Academy, and School of Fire Officers, and Military Nursing Academy (SAN), Kavala, Greece)

In series: Energy Policies, Politics and Prices
Publication Date: 03/04/2021
149 pp.
Softcover: 978-1-53619-273-5, $95.00
e-book: 978-1-53619-346-6, $95.00

This book is an approach, in the wider theoretical considerations on scientific research and study, of issues relating to energy resources and energy security and, at the same time, it is a case study on Eastern Mediterranean energy security. The Mediterranean has been known since ancient times as a large semi-enclosed sea, surrounded by more than two states as it lies between three continents: Europe, Asia and Africa. However, developments in the 21st century have necessitated viewing it conceptually as a distinct “new” region with specific characteristics. Comprised by Cyprus, Egypt, Greece, Israel, Lebanon, Libya, Syria, Turkey, Italy the region is assuming increased significance in world affairs. More specifically, the region of the Eastern Mediterranean is currently of vital importance for the EU, due to several prospects and challenges, such as migration flows, energy, security and sustainability of the region. The individual objectives are the recognition of energy actions and resources, forms of energy, energy security and in general, all actions at the energy level mentioned in the specific area. Research this study will focus on the qualitative method to the subject. The structure of the present study was developed as follows: The Preface provides a general presentation of the topic. The first chapter presents an overview of eastern Mediterranean and energy issues. The second chapter reports on energy resources and it focuses on energy security and its basic principles. The third chapter is about energy and security. The fourth Chapter offers discussion on European Union’s energy policy development and on the EU interests, strategy and policy regarding the Eastern Mediterranean region. The fifth chapter presents the changes in the East Mediterranean energy map and data on geopolitical chessboard. The last chapter presents the conclusions. A useful tool in completing this study was the understanding of the delicate ethnocultural and religious synthesis of the region, the current challenges and underlying controversies, considering the interlinked nature of interests and the importance of cross-border affiliations. All the findings of the study demonstrate certain dimensions of a reality, which are expected to be dynamic, creating risk but also future opportunities. The main finding of the study points out not only the strong correlation between energy, power, economics and politics but also the increased dependence of the latter two on the former, thus creating a hotbed of tensions, rivalries, and conflicts every time the existing relationship between economy and energy are destabilized. The shifting to energy sources, which are safe and eco-friendly, is a one-way process, the only means of survival and safe development for
humanity. Generating energy based on economic, safe, cost-efficient and renewable criteria is the current ecological and technological challenge if, firstly, the vast interests in the energy sector are dealt with successfully. Finally, this book will be of key interest to scholars and students, for researchers in the fields of Energy Economics, Policy, and Security, Energy Law, Business, Regulation and Policy, Geopolitics, who aim to have a better understanding of the current trends or research in the relevant fields, for professionals in EU politics and foreign policy, energy policy and security, and more broadly to security studies, European politics and international relations and newcomers in the profession of energy security, and for policymakers who intend to apply the collective knowledge included into this volume into policy and decision-making.

**Advanced Power Systems and Security: Computer Aided Design**

*Samir Abood (Department of Electrical and Computer Engineering, Prairie View A&M University, Prairie View, TX, USA) and Muna Fayyadh (American InterContinental University-Houston, Houston, TX, USA)*

In series: Energy Science, Engineering and Technology

Publication Date: 11/16/2020

464 pp.

Hardcover: 978-1-53618-785-4. $270.00
e-book: 978-1-53618-863-9. $270.00

ADVANCED POWER SYSTEMS AND SECURITY: Computer-Aided Design is a textbook that provides an excellent focus on the advanced topics of the power system and gives exciting analysis methods and a cover of the important applications in the power systems. At the beginning of each chapter, an abstract that states the chapter objectives. And then the introduction for each chapter. All principles are presented in a lucid, logical, step-by-step approach. As much as possible, the authors avoid wordiness and detail overload that could hide concepts and impede understanding, and in each chapter, the authors present some of the solved examples and applications using a computer program.

Toward the end of each chapter, the authors discuss some application aspects of the concepts covered in the chapter using a computer program.

In recognition of requirements by the Accreditation Board for Engineering and Technology (ABET) on integrating computer tools, the use of MATLAB® and ATP version of the Electromagnetic Transients Program (EMTP) are encouraged in a student-friendly manner. MATLAB® is introduced in Appendix C and applied gradually throughout the book.

Each illustrative example is immediately followed by practice problems. Students can follow the example step by step to solve the practice problems without flipping pages or looking at the end of the book for answers. These practice problems test students’ comprehension and reinforce key concepts before moving on to the next section.

The book is intended as a textbook for a senior-level undergraduate student in electrical and computer engineering departments, and appropriate for Graduate Students Industry Professionals, Researchers, and Academics.

The book has more than 11 categories and millions of power readers, and it can use in more than 400 electrical engineering departments at the top of universities all over the world.

Based on this information, targeted lists of the Engineers from which specific disciplines will purchase

- Electrical engineers
- Computer engineers.
- Power Control engineers.
- Electronics engineers.
- Technical power system engineers
- Protection engineers
- Design engineers.
- Distribution engineers.

The book gives rich information for the industrial engineer and electric control engineer because it is contents more details about control of power flow and the design of distribution networks.

The reader will able to modeling, designing, and implement different parts of the power system after he/she finishes reading this book. The book’s strengths

- The book using for various academic and industrial levels.
- The book is giving rich and essential information about power systems and give the fundamental study for the next book (power system protection and control)
- The book including a lot of solved examples and problems in each chapter.
- The results were obtained from the MATLAB program and ATP-EMTP program for different topics.
- Power system protection and control will include in the next part of the book.
- After finish reading the book, the reader will be able to manage and control the power system parameters, and it will help him in power station work and control centers.
The book will assist the researchers in their field of power system track. The student will be able to improved coordination between power demand and generation, and use of modern information technology and program.

**Advances in Energy Research. Volume 34**  
*Morena J. Acosta*  
In series: *Advances in Energy Research*  
Publication Date: 12/30/2020  
207 pp.  
Hardcover: 978-1-53618-980-3. $250.00  
e-book: 978-1-53618-997-1. $250.00  
This compilation first describes a system wherein a high-nuclear high-temperature reactor supplies constant power to a thermal energy storage unit of molten lithium chloride salt, which provides the required thermal energy for a closed energy conversion system.  
Next, a compact power generation-storage system is constructed using a direct current-alternating current inverter, spherical Si solar cells, and a lithium-ion battery integrated into a single module.  
The authors discuss how, since a number of different countries’ electric power utilities are adding capacity, there is an opportunity to introduce a new, longer-lasting design for a wind turbine system.

A method to reduce the consumption of high-pressure steam and cool fluid in the ethanol process is presented, as well as a plan to reduce the emission of environmental pollutants from the H-501 furnace in the maleic anhydride process.  
Energy optimization is carried out for the condensation stabilization component of Ilam gas refinery.  
The closing study focuses on techniques such as the adjacent tree-bounded hop algorithm that may be used to reduce the energy consumption of wireless sensor networks, whether static or dynamic.

**Energy Conversion Systems: An Overview**  
*Saurabh Mani Tripathi, PhD* (Department of Electrical Engineering, Kamla Nehru Institute of Technology, Sultanpur, India) and *Sanjeevikumar Padmanaban, PhD* (Department of Energy Technology, Aalborg University, Esbjerg, Denmark)  
In series: *Energy Science, Engineering and Technology*  
Publication Date: 02/10/2021  
372 pp.  
Hardcover: 978-1-53619-131-8. $230.00  
e-book: 978-1-53619-200-1. $230.00  
This edited book is intended to serve as a resource for engineers, scientists and specialists engaged in becoming familiarized with green energy conversion for a clean atmosphere with an adaption of ‘more-renewable’ for power generation. The book is comprised of nine original chapters dealing with state-of-the-art studies on the subject.  
for green engineering for the future. This edited volume is an extensive collection of state-of-the-art studies on the subject.

**Energy Storage Systems: An Introduction**  
*Dr. Satyender Singh (Post Doctorate, PhD, M Tech, BTech, Assistant Professor, Department of Mechanical Engineering, Dr B R Ambedkar National Institute of Technology Jalandhar, India)*  
In series: *Energy Science, Engineering and Technology*  
Publication Date: 12/14/2020  
288 pp.  
Hardcover: 978-1-53618-873-8. $195.00  
e-book: 978-1-53618-910-0. $195.00  
This book is primarily for undergraduates, graduates and research scholars working in the field of energy storage systems. The book details the mathematical and experimental analysis of energy storage systems and can be referenced by different engineering sectors, including: mechanical, chemical, civil and energy engineering, and is equally important for scholars of physics and chemistry. Various aspects of thermal energy storage systems are described, such as lithium-ion batteries, nuclear reactors, latent heat storage with PCM embedded porous media, CCHP with TESS, PCM in solar collectors, and grain dryers.
Chapter one provides an overview of the development of various kinds of cathodes and anodes. In short, this chapter is an outline of the development stages of Li-ion battery electrochemistry, discussing the commercial success and current challenges in the field with mitigation strategies, as well as the future of Li-ion batteries.

In the system described in chapter two, a high-nuclear high-temperature reactor supplies constant power to the thermal energy storage unit of molten lithium chloride salt, which provides the required thermal energy for a closed energy conversion system of the Bryton cycle. During regular operation, the thermal energy storage unit stores heat overnight for use during peak demand periods in the day. In this case, the nuclear reactor remains at a constant level of thermal capacity. A detail of energy storage in PCM embedded with porous media is presented in chapter three, and the applications of such systems are presented in chapter four. PCM has gained the attention of researchers due to longer thermal recycling and chemical stability. Moreover, high latent heat capacity is one of the most significant aspects contributing to the popularity of PCMs, and the low thermal conductivity of PCMs limits their usage in many thermal applications and can be improved by using porous media as an embedded material. Chapter five delineates the optimal working point of a system consisting of several independent units capable of trading electricity based on the consumption of various fuels. The utilization of a heat storage tank was determined using a genetic algorithm, and the modeling accuracy was compared. Chapters six and seven present a clear understanding of the working and investigation procedures of natural convection grain dryers. This book will be helpful for understanding the fundamentals of thermal energy storage systems.

Fundamentals of Electrical Power Systems: A Primer with MATLAB
Samir Abood (Department of Electrical and Computer Engineering, Prairie View A&M University, Prairie View, TX, USA)
In series: Energy Science, Engineering and Technology
Publication Date: 12/02/2020
507 pp.
Hardcover: 978-1-53618-637-6, $310.00
e-book: 978-1-53618-789-2, $310.00
Fundamentals of Electrical Power Systems: A Primer With MATLAB®, is a textbook that provides an excellent review of fundamental of the power system and give exciting analysis methods and a cover of the all components of power systems. At the beginning of each chapter, an abstract that states the chapter objectives. And then the introduction for each chapter. All principles presented in a lucid, logical, step-by-step approach. As much as possible, the author avoids wordiness and detail overload that could hide concepts and impede understanding. and In each chapter, the author presents some of the solved examples and applications using a computer program. Toward the end of each chapter, the author discusses some applications aspects of the concepts covered in the chapter using a computer program.
In recognition of requirements by the Accreditation Board for Engineering and Technology (ABET) on integrating computer tools, the use of MATLAB® is encouraged in a student-friendly manner. MATLAB® is introduced in Appendix C and applied gradually throughout the book.
Each illustrative example is immediately followed by practice problems. Students can follow the example step by step to solve the practice problems without flipping pages or looking at the end of the book for answers. These practice problems test students’ comprehension and reinforce key concepts before moving on to the next section.
The book is intended as a textbook for a senior-level undergraduate student in electrical and computer engineering departments, and appropriate for Juniors, Undergraduate Students, Graduate Students Industry Professionals, Researchers, and Academics.
The prerequisites for a course based on this book are knowledge of standard mathematics, including calculus and complex numbers.
The book’s strengths
- The book using for various academic and industrial levels.
- The book is giving rich and essential information about power systems and give the fundamental study for next book (power system protection and control)
- The book Including a lot of solved examples and problems in each chapter.
- The results obtained from the MATLAB program for different topics.
- Power system protection and control will include in the next part of the book.
How has the world’s largest inland body of salty water escaped economic and political notice for so long? The Caspian Basin is an underexplored topic with scarce literature on its geomorphology, legal disputes, pipeline diplomacy, energy deposits, and environmental concerns.

As such, the authors take a comprehensive approach in presenting an all-encompassing study on this unique geographical region. Readers will not only acquire basic knowledge of how Caspian states and other foreign actors interact, but also learn about related issues in the greater Eurasian/global environment, including territorial concerns, environmental issues, pipeline politics, energy reserves, and so on.

Any reader who wants to familiarize themselves with this region will benefit from this book. Not only will this body of work lessen the dearth of information on this region for Caspian riparian states and other affiliated bodies, but it will also generate an altogether new expanse of scholarly conversation and international research.

The Future of District Heating
Matthew Vasilyev

The Future of District Heating begins by discussing the way in which designing district heating systems to operate below 167°F (75°C) reduces the overall delivered cost of heat by reducing the capital cost of the heat source, allowing for the use of non-traditional and renewable sources, reducing the cost of piping, and allowing for the use of large-scale thermal storage.

The authors describe the development of the provisions of the European Union law which apply to district heating to examine the particular legal acts in force, and provide an outlook on future developments.

In closing, an experimental investigation is presented on a closed-loop earth-to-air heat exchanger (underground air tunnel) in heating mode.

Environmental Engineering

Planning, Progress and Challenges of Built Environments
Felipe Silva Pinto

Planning, Progress and Challenges of Built Environments first examines China’s urbanization, presenting a brief historical review of urbanization in China and focusing on its development during the pro-reform period.

Following this, the authors explore notions of publicness and privateness through the lens of Hong Kong’s public rental sector, using data collected from a physical survey of selected housing estates and 14 in-depth interviews with architects, housing managers and residents.
Post-consumer packaging waste is explored and synthesized as a secondary resource for re-contextualizing and developing applications in architecture.

The diverse interactions between water and rock masses are discussed, focusing on lines of conceptual continuity from rock masses to built structures made from stone.

Issues concerning sustainability at university campuses are discussed in terms of obtaining materials, the impact of the presence of said materials, and the potential of these materials as teaching aids.

Manufacturing

Advanced Manufacturing: Progress, Trends and Challenges
Mohamed Arezki Mellal (Full Associate Professor, Faculty of Technology, Hamed Bougara University, Algeria; University of Maryland, MD, USA)
In series: Manufacturing Technology Research
Publication Date: 12/10/2020
268 pp.
Hardcover: 978-1-53618-870-7, $195.00
e-book: 978-1-53618-923-0, $195.00

Advanced manufacturing processes and systems are some of the most important things in the industry. All industrial sectors need these kinds of processes and systems to achieve high-quality levels and standards. In Industry 4.0, several challenges must be investigated to deal with its complexity.

The book “Advanced Manufacturing: Progress, Trends and Challenges” is a source of the latest research and technical notes in manufacturing systems. This book is useful for students, researchers, and all readers interested in this topic. It is organized into eight chapters.

Industry 4.0: Principles, Effects and Challenges
Yılmaz Uygun (Head of Logistics Engineering and Technologies Group, Study Program Chair MSc Supply Chain Management, Jacobs University Bremen, Bremen, Germany)
In series: Manufacturing Technology Research
Publication Date: 09/11/2020
291 pp.
Hardcover: 978-1-53618-331-3, $195.00
e-book: 978-1-53618-423-5, $195.00

Industry 4.0 will disrupt and change how we produce, do business, and live our lives. Related to manufacturing, the way products are produced will change radically not only within a company but also across companies. So, like any other revolution, the fourth industrial revolution will also produce winners and losers. Occupations, companies, and industries will die whereas new ones will emerge. So, companies need to adapt properly to those new technologies in order not to be pushed out of business.

This book makes a contribution to understand the developments related to Industry 4.0. Experienced and well-established authors came together to shed light on different but complementary topics to offer a holistic view on Industry 4.0. Here, the Industry 4.0 ecosystem, implications of Industry 4.0 on human workforce, technical challenges and application examples are addressed.

Manufacturing Systems: Recent Progress and Future Directions
Mohamed Arezki Mellal (Associate Professor, Faculty of Technology, M’Hamed Bougara University, Algeria and University of Maryland, MD, USA)
In series: Manufacturing Technology Research
Publication Date: 10/28/2020
562 pp.
Hardcover: 978-1-53618-676-5, $310.00
e-book: 978-1-53618-763-2, $310.00

Manufacturing has seen progress during the industrial revolution from Industry 1.0 to 4.0. Recent manufacturing processes involve various systems and several challenges remain to handle. For example, the spread of the virus COVID-19 in the late of 2019 has
talked many industrial abilities and various manufacturing systems shown incapacities. Therefore, any manufacturing system and process should be improved and tested under crisis scenarios. The book "Manufacturing Systems: Progress and Future Directions" is a source of the latest research and technical notes in manufacturing systems. This book is useful for students, researchers, and all readers interested in this topic. It is organized into twenty-seven chapters.

Materials Science

A Complete Guide to Hybrid Materials
*Norris Torres*

In series: *Materials Science and Technologies*
Publication Date: 11/13/2020
141 pp.
Softcover: 978-1-53618-820-2. $82.00
e-book: 978-1-53618-829-5. $82.00

A Complete Guide to Hybrid Materials opens with a study wherein the casting method is used to incorporate hybrid materials based on layered zinc hydroxide salts and phenolic compounds into the polymer matrix of polyvinyl alcohol to form composite films. The authors review recent advances in the preparation and applications of inorganic nanoparticle molecularly imprinted polymers. Due to the specific binding sites, the result exhibits good selectivity, reproducibility, high binding capacity and fast kinetics for the rebinding of the analyte. The closing chapter focuses on the formation of nano clay, an exfoliated clay, and proper dispersion in a polymer matrix.

Advances in Materials Science Research. Volume 42
*Maryann C. Wythers*

In series: *Advances in Materials Science Research*
Publication Date: 09/24/2020
248 pp.
Hardcover: 978-1-53618-441-9. $250.00
e-book: 978-1-53618-545-4. $250.00

Advances in Materials Science Research. Volume 42 first evaluates the physical, chemical, and mechanical properties of poly(1,1-difluoroethylene) or poly(vinylidene fluoride) and some of its copolymers and composites. The quantitative study of the p-type doping of a-Si:H thin films carried out by combining in situ Kelvin probe and UV-visible spectroscopic ellipsometry measurements is explored. The authors go on to discuss how graphene-based materials have shown great usefulness because they can be chemically combined with other materials to obtain new interesting materials with new chemical and physical properties. In the subsequent study, electron transport properties of proposed field-effect transistors constructed by some low-dimensional nanomaterials are reported by the density functional theory simulation combined with a non-equilibrium Green function method. Following this, the methods used to synthesize structured catalytic supports by coating in spherical geometry are reviewed in conjunction with other coating methods on spheres with applications in photocatalysis. Additionally, a power storage system using spherical silicon solar cells, a maximum power point tracking charge controller, a lithium-ion battery and a direct current-alternating current inverter using silicon carbide devices is constructed and studied. The electrochemical behaviour of 316L stainless steel in the hypochlorite sodium bleaching process is also studied and findings are described. In the concluding study, on the basis of the the strain-rate cycling tests associated with the ultrasonic oscillation, p p was obtained as the effective stress due to the impurities which lie on the mobile dislocation.
Advances in Materials Science Research. Volume 43
Maryann C. Wythers
In series: Advances in Materials Science Research
Publication Date: 10/16/2020
250 pp.
Hardcover: 978-1-53618-716-8, $250.00
e-book: 978-1-53618-730-4, $250.00

Advances in Materials Science Research. Volume 43 begins with a review of the mechanical and durability properties and microstructural characteristics of concrete made with partial incorporation of coal bottom ash. Following this, the chemical aspects of interactions of aluminum-containing accelerators in Portland cement-based materials are described, explaining their effect on the kinetics of Portland cement hydration and the stability of Portland cement materials when exposed to various corrosive factors. A review of India’s cement industry is provided, particularly focusing on water positive manufacturing, consuming wastes like fly ash and slag, reducing CO2 emissions, and taxes.

Several different types of single crystal and multilayer composite heavy-oxide scintillation materials are discussed, having been developed and characterized for fast neutron detection for homeland security and nuclear safeguards applications. A new class of inorganic hydrogen-containing scintillators based on potassium dihydrogen phosphate and related compounds activated by ions of thallium or cerium is also investigated.
The use of mixed metal oxides as oxygen carriers under the chemical looping reaction scheme is proposed to overcome the current disadvantages of the partial oxidation of methane processes. In the concluding study, titanium, aluminum nitride and hafnium oxide thin films are applied to ceramic electrical insulators to promote surface self-cleaning properties to minimize the effects of leakage current.

Advances in Materials Science Research. Volume 44
Maryann C. Wythers
In series: Advances in Materials Science Research
Publication Date: 01/13/2021
221 pp.
Hardcover: 978-1-53619-028-1, $250.00
e-book: 978-1-53619-092-2, $250.00

Advances in Materials Science Research. Volume 44 provides an overview of the emerging field of phosphorescent nanomaterials, including synthesis protocols and characterization issues. The authors discuss the synthesis methods and characterization of synthesized compounds by X-ray powder diffraction analysis, Fourier-transform infrared spectroscopy and scanning electron microscopy. The carefully designed techniques for engineering process-induced strain to enhance carrier mobility or transform the band-gap from indirect to direct nano-devices are described.

A compilation of investigations related to the formation of cerium coatings on an AZ91D Mg alloy are examined in an effort to improve its corrosion resistance in simulated body fluid. Following this, an article reports on an insightful portable microfluidic experimental setup for the fast and ultraselective detection of Hg2+ ions in a picomolar range using a cantilever-based piezoresistive sensor. The concluding study explores the behavior of the order parameter and the magnetization of antiferromagnetic solids subjected to mutually parallel staggered and magnetic fields.

An Introduction to Contact Resistance
Zuoguang Liu, PhD, (Semiconductor Technology Research, IBM, Albany, NY, USA)
In series: Materials Science and Technologies
Publication Date: 10/09/2020
185 pp.
Softcover: 978-1-53618-501-0, $95.00
e-book: 978-1-53618-583-6, $95.00

Contact resistance is both an old and new topic. It is old because fundamentals of the semiconductor-metal contacts were established in the 1930s even earlier than the study on Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET). The new knowledge is on material and integration aspects for contact resistance reduction. As the MOSFETs become smaller and smaller, device parasitics start to dominate performance since the 2010s. The resistance part in MOSFET RC delay is mainly from external parasitics.
Science and Technology

particularly the contact resistance. In the past decade, 3D MOSFETs, also named FinFETs, became the device structure in leading semiconductor technology. The 3D structure brings a unique opportunity for engineering the contact resistance. In physics, this book introduces MOSFET device electronics and contact physics. In material science, a variety of contact metals and silicides are covered. In electrical characterization, test structures and measurements of contact resistance are discussed in depth. In technology, state-of-the-art process techniques, material engineering, and integration for contact resistance reduction are introduced. This book can serve as a reference book for students in electrical engineering and material science major and professionals in semiconductor industry.

Schottky Barriers: An Overview
Saul T. Redd
In series: Materials Science and Technologies
Publication Date: 11/06/2020
203 pp.
Softcover: 978-1-53618-681-9, $95.00
e-book: 978-1-53618-818-9, $95.00

A Schottky barrier is an electrostatic interface between a metal and a semiconductor that plays a vital role in many electronic devices. Schottky Barriers: An Overview opens with a brief review of the metal-semiconductor Schottky junction, the basic charge transport theory and the issues associated with these barriers. Additionally, the authors provide an overview of recent developments in the field of Schottky contacts to ZnO and related materials, such as ZnMgO, BeZnO, and BeMgZnO.

Despite the fundamental importance of Schottky barrier height, the mechanisms which control the barrier formation are still far from understood. As such, for a better understanding of Schottky barriers and barrier height, the authors discuss various empirical models.

In closing, AlGaN/GaN Schottky barrier diodes with and without in-situ silicon carbon nitride cap layers are investigated, with the fabricated SBD with a SiCN cap layer exhibiting improved electrical characteristics.

Ceramics and Glasses

Bioactive Glasses: Properties, Composition and Recent Applications
Daniel Arcos and María Vallet-Regí (Department of Chemistry in Pharmaceutical Sciences, Faculty of Pharmacy, Universidad Complutense de Madrid, Spain)
In series: Materials Science and Technologies
Publication Date: 09/24/2020
409 pp.
Hardcover: 978-1-53618-337-5, $230.00
e-book: 978-1-53618-579-9, $230.00

More than 50 years have passed since Professor Larry L. Hench discovered Bioglass. However bioactive glasses still awake the fascination of scientists, lecturers, students, dentists, orthopedic surgeons, etc. all over the World. The research developed during the subsequent decades has resulted in new materials that significantly differ from the original melt-derived Bioglass. The use of the sol-gel process in the 1990’s and the discovery of mesoporous bioactive glasses in the 2000’s revealed new potential applications in the field of bone regeneration and drug delivery platforms. Besides, the development of rapid prototyping techniques has allowed manufacturing bioglass-based 3D scaffolds in combination with polymers, which boosts the long-standing expectative of using bioactive glasses for the treatment of critical bone defects. Finally, the advances in nanomedicine have opened new research lines involving the synthesis and development of bioactive glass nanoparticles.

“Bioactive glasses: properties, composition and recent applications” consists of ten chapters written by worldwide recognized experts in this field. The book covers the most important topics in the field of bioactive glasses, from its discovering to the most recent advances in preparation methods and applications. This book is addressed to researchers involved in the field of bioceramics, but it also an excellent tool for undergraduate and Ph.D. students, given that nowadays Biomaterials Science is a subject included in the program of many universities. Only knowing the discoveries that fifty years ago fascinated us, our students will understand the current efforts to expand the applications of bioactive glasses.
Polymers

Fiber-Reinforced Polymer: Processes and Applications
Catalin Iulian Pruncu (Research Fellow, University of Strathclyde and Imperial College London, UK), Selim Gürgen, PhD (Associate Professor, Head of Mechatronics Program, Eskişehir Osmangazi University, Eskişehir, Turkey) and Md Enamul Hoque (Department of Biomedical Engineering, Military Institute of Science and Technology (MIST), Mirpur Cantonment, Dhaka, Bangladesh)

In series: Polymer Science and Technology
Publication Date: 02/10/2021
454 pp.
Hardcover: 978-1-53619-049-6, $270.00
e-book: 978-1-53619-121-9, $270.00
Fiber-reinforced polymers play an important role in the progress of materials science. Fiber-Reinforced Polymer: Processes and Applications presents the science of fiber-reinforced polymer composites from the manufacturing stage to its applications. Apart from the fabrication of the composites, its machinability properties are also discussed. This book considers both natural and synthetic fibers in polymer composites, as well as their utility for different sectors such as automotive, aviation and biomedical engineering. In addition to the overview of fiber-reinforced polymers, engineering properties of these materials are discussed. The book also discusses the impact of environmental aspects such as moisture uptake on the properties of fiber-reinforced polymer composites. Since nano-engineering is a hot topic in the field of composites, the benefits of nano-fibers are discussed, as well as their fabrication methods, properties and applications. Moreover, fiber selections in polymer matrices are discussed by considering the interactions between fibers and matrices, as well as taking their applications into account.

Materials Technology / Clothing and Textiles

Challenges and Opportunities in the Textile Industry
Wallace G. Tarrant
In series: Materials Science and Technologies
Publication Date: 10/30/2020
171 pp.
Softcover: 978-1-53618-770-0, $95.00
e-book: 978-1-53618-780-9, $95.00
This compilation presents a detailed review of current research, developments, and progress on nanotechnology usage for the elimination of dyes from effluents released by textile industries. The benefits of using nanomaterials for functionalized textile production are presented, and the applications of nanomaterials in the most known functional technical textiles are discussed. The authors present the results of empirical studies carried out in the Portuguese industrial context, including the textile sector, where the relationship between negative effects associated with shift work and the adoption of certain management practices by organizations is analyzed. Additionally, the authors discuss how, to achieve the Fourth Industrial Revolution, technological tools must be incorporated into both the production and consumption of textiles. The closing study indicates that it is possible to make objective pilling detection easily for standard fabric structures in the textile industry using databases created by measuring lots of samples.
**Military Science**

*Submarine Warfare: Past, Present, and Future*
*Herbert C. Fyfe*

In series: *Military and Veteran Issues*
Publication Date: 10/01/2020
313 pp.
Hardcover: 978-1-53618-683-3. $230.00
e-book: 978-1-53618-701-4. $230.00

Submarine Warfare: Past, Present, and Future is the first book in the English language on submarine warfare. The author’s aim has been to produce a book which should appeal to the general public, and may also be found on the shelves of the student of naval history and naval warfare.

**Nanotechnology and MEMS**

*Advances in Nanotechnology. Volume 24*
*Zacharie Bartul and Jérôme Trenor*

In series: *Advances in Nanotechnology*
Publication Date: 09/18/2020
299 pp.
Hardcover: 978-1-53618-460-0. $250.00
e-book: 978-1-53618-599-7. $250.00

Advances in Nanotechnology. Volume 24 introduces the basic principle of resonance energy transfer, discussing the resonance energy transfer process involved in plasma noble metallic nanoparticles on the basis of new research. The authors discuss the principles and the mechanisms of Magnetofection™ and illustrate it by using multiple examples of its applications in viral and non-viral nucleic acid delivery, both in vitro and in vivo.

In one study, polyvinyl chloride is prepared with the percentages 30 wt.% PVC (30 wt%) loaded with 3-8 wt.% of titanium oxide nanoparticles, and the performance of prepared membranes is calculated.

Recent progress on the synthesis of amphiphilic and stimuli responsive block copolymers by Reversible Addition-Fragmentation chain Transfer polymerization polymerization is assessed, with special focus on triblock terpolymers. The applications of Pluronic micelles in drug solubilization and delivery are explored for a better understanding of the importance of these materials in pharmaceutical applications. Later, the characteristics and transfer functions of the electroelastic digital-to-analog converter actuator for nanotechnology are examined.

In closing, the authors review the magnetic and electric properties of different systems made up of the so-obtained Ni nanowires.

**Software Engineering**

*Software Engineering: Artificial Intelligence, Compliance, and Security*
*Brian D’Andrade, PhD (Principal Engineer, Exponent, Inc., Bowie, MD, USA)*

In series: *Computer Science, Technology and Applications*
Publication Date: 12/30/2020
259 pp.
Hardcover: 978-1-53618-989-6. $195.00
e-book: 978-1-53619-063-2. $195.00

Information security is important in every aspect of daily life. This book examines four areas where risks are present: artificial intelligence (AI), the internet of things (IoT), government and malware. The authors channel their experience and research into an accessible body of knowledge for consideration by professionals.
AI is introduced as a tool for healthcare, security and innovation. The advantages of using AI in new industries are highlighted in the context of recent developments in mechanical engineering, and a survey of AI software risks is presented focusing on well-publicized failures and US FDA regulatory guidelines. The risks associated with the billions of devices that form the IoT grow with the availability of such devices in consumer products, healthcare, energy infrastructure and transportation. The risks, software engineering risk mitigation methods and standards promoting a level of care for the manufacture of IoT devices are examined because of their importance for software developers. Strategic insights for software developers looking to do business with the US federal government are presented, considering threats to both public and private sectors as well as governmental priorities from recent executive and legislative branch actions. Finally, an analysis of malicious software that infects numerous computer systems each day and causes millions of dollars in damages every year is presented. Malicious software, or “malware,” is software designed with hostile intent, but the damage may be mitigated with static and dynamic analyses, which are processes for studying how malware operates and analyzing potential impacts.

**Special Topics**

### 5G Networks: Background, Issues and Security

**Max Hemmings**

In series: *Technology in a Globalizing World*

Publication Date: 12/22/2020

428 pp.

Hardcover: 978-1-53618-972-8. $230.00


Since the first mobile phones were made available in the 1980s, telecommunication providers have been investing in mobile networks to expand coverage, improve services, and attract more users. First-generation networks supported mobile voice calls but were limited in coverage and capacity. To address those limitations, providers developed and deployed second-generation (2G) mobile networks, then third-generation (3G), and fourth-generation (4G) networks. Each generation offered improved speeds, greater capacity, and new features and services. In 2018, telecommunication providers began deploying fifth-generation (5G) networks to meet growing demands for data from consumer and industrial users. 5G networks are expected to enable providers to expand consumer services (e.g., video streaming, virtual reality applications), support the growing number of connected devices (e.g., medical devices, smart homes, Internet of Things), support new industrial uses (e.g., industrial sensors, industrial monitoring systems), perform advanced data analytics, and enable the use of advanced technologies (e.g., smart city applications, autonomous vehicles). This book provides a background on mobile technologies, and addresses the race to 5G, factors affecting 5G deployment, and national security.

### Advances in Engineering Research. Volume 37

**Victoria M. Petrova**

In series: *Advances in Engineering Research*

Publication Date: 09/02/2020

225 pp.

Hardcover: 978-1-53618-309-2. $250.00

e-book: 978-1-53618-362-7. $250.00

*Advances in Engineering Research. Volume 37* opens with an analysis of the advantages and mechanisms of ink-jet printing techniques in negative temperature coefficient thermistor ceramics, mainly exploring the basic requirements to ink-jet print ceramic microspheres/beads. The authors go on to provide a brief historical review of the science of natural convection from vertical cylinders, followed by an in-depth review and summary of the major developments in the last 20 years. A survey of frequently encountered classes of convection systems is presented, as well as a cursory introduction to how the concepts and relations derived for a generalized buoyancy-induced flow system may be adapted to each. Solution optimization for task scheduling using a hybrid cuckoo algorithm is discussed. Cuckoo search is an effective algorithm focused on swarm intelligence, efficient for solving highly non-linear optimization problems. Subsequently, heat transfer characteristics of an open cubic cavity of side 0.034 m with thermally insulated side-walls, bottom at constant temperature and top open to the environment is studied experimentally. The authors present frequency domain equalization techniques for single-carrier and orthogonal frequency-division multiplexing. The described techniques are classic approaches including least squares, zero-forcing, and more.
Following this, a comprehensive design and implementation based on the STM32 microcontroller is proposed for a two-wheel self-balancing robot. In addition, mathematical modeling is performed based on the thermal behavior of an underground substation of an energy concessionaire in the southern region of Brazil. Lastly, an original architecture of residual neural network using skeleton data is proposed. A new complex linear layer aimed at retrieving the internal relationships of neural cells is discussed.

**Advances in Engineering Research. Volume 38**

*Victoria M. Petrova*

**In series: Advances in Engineering Research**

Publication Date: 10/09/2020

296 pp.

Hardcover: 978-1-53618-508-9, $250.00
e-book: 978-1-53618-706-9, $250.00

In engineering, there are different design objectives for heat pump systems, such as the maximum coefficient of performance, the maximum net heat flow rate into the high temperature heat source and the best thermo-economic performance. As such, the authors provide a comprehensive overview of heat pump technology, focusing on system design, performance, optimization and applications associated with this technology. Following this, a research study on the optimal operation of a power system in the presence of renewable sources is presented, considering two objectives: decreasing power losses and improving the voltage level in the nodes of the electric network. A method for detecting short-path wormhole tunnels rather than relying solely on topological features of the network is described. In a wormhole attack, the malicious nodes generally work in pairs and set up a high-speed tunnel for long distances between them. An approach to multi-objective optimization techniques is presented and applied to either subtractive or additive manufacturing processes. Additionally, the suitability of multi-objective optimization methods is depicted through a case study related to the selective laser melting process. The performance evaluation of the binary heap tree-based discrete particle swarm optimization is presented and compared with existing Pareto dominance-based multi-objective techniques such as non-dominated sorting genetic algorithm-II and non-dominated sorting particle swarm optimization. In closing, the authors present a problem that highlights the influence that bidirectional power flows may have on solutions regarding the optimal allocation of energy storage systems in real microgrids in the developing country of Romania.

**Advances in Engineering Research. Volume 39**

*Victoria M. Petrova*

**In series: Advances in Engineering Research**

Publication Date: 12/02/2020

265 pp.

Hardcover: 978-1-53618-714-4, $250.00
e-book: 978-1-53618-733-5, $250.00

Advances in Engineering Research, Volume 39 first discusses clustering, a well-known problem in statistics and engineering concerning how to arrange a set of vectors (measurements) into a number of groups (clusters). The fundamental concepts of hierarchical algorithms are described, along with a review of the different linkage criterions and recent developments aimed at improving the pioneer versions. The authors present recent developments regarding the use of water electrolysis, which results in the obtainment of syngas that may be used for power generation and the production of fuels and chemical intermediate compounds. A multi-objective optimization model for optimizing the operation of natural gas pipeline networks is developed for different network configurations, namely linear, branch and looped topologies. An overview of degummed biodiesel preparation is provided, along with a study of engine performance parameters such as brake power, brake thermal efficiency and brake specific fuel consumption of degummed biodiesel and their diesel blends. The authors go on to introduce the principles of the Distributed Reflective Denial of Service attack, discussing the threats of this kind of attack, as well as the impact on the victim server and victim network. In the closing study, a comprehensive model of a quadrotor is built with physical analysis, parameter and function identifications. The propeller and motor properties are tested in a wind tunnel in scheduled conditions in the presence of relative air flow.
Advances in Engineering Research. Volume 40
Victoria M. Petrova
In series: Advances in Engineering Research
Publication Date: 12/10/2020
253 pp.
Hardcover: 978-1-53618-754-0. $250.00
e-book: 978-1-53618-929-2. $250.00

Advances in Engineering Research. Volume 40 first presents the characteristics of the laser-plasma extreme ultraviolet radiation from solid rare gas targets composed of Xe, Kr and Ar, along with the performances of the radiation sources developed using these targets. Following this, the authors consider the most important issues related to creating a universal system of adaptive applications for use in the Internet of Things and Internet of People systems. Previous techniques and recent advances in circuit techniques are reviewed, and a comparison of the reported techniques in the context of low-pass continuous-time Delta-Sigma modulators is presented.

A comprehensive overview of the properties of aggregates used on roads is provided, particularly focusing on their influence on the mechanical and skid resistance of road surfaces. An analytical approach that allows for a rough prediction of the acoustic parameters of road surface is also presented. The attenuation depends on frequency, propagation distance, angle of incidence and geometric configuration of sources and sensors.

Due to computation complexity, the VLSI implementation of Inter-Prediction in the H.264/Advanced Video Coding imposes latency, memory bandwidth, and area cost challenges. To tackle these obstacles, the authors discuss a design methodology which exploits the relationship between the main processes in inter-prediction to enhance the performance while keeping an affordable design cost.

The penultimate study focuses on the way we can interpret linguistic algebra to understand and reverse translation formulas' linguistic algebra into natural language text as a verbal expression of meaning. This will improve the performance of any computer system when working with text.

Recent computational tools of vector fields, including vector data representations, predictive models of spatial data, as well as applications in computer vision, signal processing and empirical sciences are reviewed in closing.

Advances in Engineering Research. Volume 41
Victoria M. Petrova
In series: Advances in Engineering Research
Publication Date: 12/14/2020
287 pp.
Hardcover: 978-1-53618-882-0. $250.00
e-book: 978-1-53618-999-5. $250.00

This compilation opens with a study wherein investigations are conducted on a single cylinder four-stroke common rail direct injection conventional diesel engine using a combination of biodiesels derived from safflower oil methyl ester and dairy scum oil methyl ester in equal ratio. Another study focuses on the effect an internal jet piston provides on the piston surface with varied numbers of holes (2 and 4).

A comprehensive overview of solid propellant combustion models and numerical simulations is summarized in an effort to determine an exact propellant burning rate under different operating conditions. The authors demonstrate how advanced mesh morphing based on radial basis functions can be used to update the shape of a component acting directly on its computational mesh.

Following this, a new framework is presented for estimating the level of additive white Gaussian noise occurring in a noisy image, investigating the trailing singular values to infer the noise level. The detection technology of fluorescence lidar for biological aerosol is also studied, exploring this technique according to the dependency relation between the intensity and relative content of atmospheric biological aerosol fluorescence.

In order to overcome the problem of high transmission loss in visible light communication systems, the authors propose a novel design for a 1x4 optical demultiplexer based on the multimode interference in a slot waveguide structure that operates at 547, 559, 566 and 584 nm. A literature review concerning 3D printing models in neurosurgery is performed, offering a new way to approach cerebral pathologies.

The closing study discusses the flux-corrected transport algorithm and presents simulation results from several strong shock problems, including benchmark problems as well as impact-generated or explosive-driven shock propagation problems.
**From Chaos to Complexity Science. 20 Years of Multidisciplinary Explorations**

Franco Orsucci (Vice-Chancellor & Provost, Nicola Cusano University London, London, UK; Visiting Professor, University College London, UK; Director, Institute for Complexity Studies, Rome, Italy) and Nicoletta Sala (Institute for Complexity Studies, Rome, Italy; CERFIM (Research Center for Mathematics and Physics), Locarno, Switzerland; ISSI (Institute for Scientific and Interdisciplinary Studies), Locarno, Switzerland)

In series: Science and Technology

Publication Date: 12/02/2020

421 pp.

Hardcover: 978-1-53618-825-7. $230.00

e-book: 978-1-53618-830-1. $230.00

This book is dedicated to the first ten years of Chaos and Complexity Letters - International Journal of Dynamical Systems Research.

This journal was born to collect and disseminate complexity science related information to anybody interested in the topic; to speed up the evolutionary development of complexity science; to extend its interactions crossing over disciplines, levels of knowledge and geography; and to foster finding new pathways in research and new applications.

The structure of CCL was specifically designed to add value to the transdisciplinary approach while, at the same time, differentiating the epistemology of different contributions.

In this enterprise we were sustained and inspired by two great companions that in different ways shared our project during its prehistory: Ilya Prigogine and Francisco Varela.

This book collects 16 papers appeared on the first ten volumes of Chaos and Complexity Letters. They range from the life sciences, to STEM and economy, in accordance with the interdisciplinary mission of the journal.

A special highlight starts with Acceleration and entropy: a macroscopic analogue of the twin paradox, possibly the last paper written by the Nobel Prize Ilya Prigogine with Gonzalo Ordonez.

Important academic specialists who wrote in our scientific journal passed away. For example, Walter Freeman, Tullio Minelli, Ilya Prigogine, and Joseph P. Zbilut. This special issue is also dedicated to them.

We are in opinion that their trajectories in life and research designed some contours of the shape of a new science to come.

**Issues with Facial Recognition Technology**

Warren Lambert

In series: Technology in a Globalizing World

Publication Date: 12/08/2020

228 pp.

Hardcover: 978-1-53618-973-5. $160.00

e-book: 978-1-53619-000-7. $160.00

Automated facial recognition systems compare two or more images of faces to determine whether they represent the same individual. Facial recognition technology (FRT) falls within the larger categories of biometric technology used to varying degrees by the government and private entities to identify persons. This book deals with some of the issues concerning facial recognition technology.
Multidisciplinary Science and Advanced Technologies

Dr. Kaushik Pal (Federal University of Rio de Janeiro, Cidade Universitária, Rio de Janeiro, Brazil), Dr. Fernando Gomes (Laboratório de Biopolímeros e Sensores/LaBioS Centro de Tecnologia–Cidade Universitária, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil) and Dr. Thinakaran Narayanan (Higher National Youth Skill Institute (IKTBN) Sepang, Bandar Baru Salak Tinggi, Selangor, Malaysia)

In series: Technology in a Globalizing World
Publication Date: 02/10/2021
257 pp.
Hardcover: 978-1-53619-959-9. $195.00
e-book: 978-1-53619-198-1. $195.00

Multidisciplinary Science and Advanced Technologies form a vast and diverse class of the engineering science and research divisions. This book discusses novel design techniques and smart mechanisms, as well as innovations that might be utilized in the future. Scientific modification can control industrial-scale assembly, a process that ultimately provides specific material function, depending on electronic development for advancements. Furthermore, the combination of supramolecular multidisciplinary technologies allows for the exploration of application-based materials. Smart materials are vital for the in-depth analysis of various morphologies. This book is an international forum for comprehensive soft-condensed matter physics, nanoscience principles, nanotechnology tools, and nanotechnology applications in the environmental, energy, and electronics sector, including a discussion of ethical issues in these fields. This book reviews the applications and market potential of a variety of media, including mirror, glazing, and display products, such as low-information content displays for banners and labels. The physicist, chemical engineer, materials scientist, nanotechnologist, and biologist at all levels, as well as academicians for unique device-based applications in various fields, will benefit from this book. Readers will gain an understanding of the practical and highly sensitive business fields for specific disciplinarians. The goal is to provide readers a broad view from a materials perspective, so that teachers can provide a comprehensive review of this technology to students. This book also highlights the entire gamut of smart engineering technologies and the materials design process of fabrications from past to present and future perspectives. The syllabi of various technical universities and research institutes are examined, explaining the basic perceptions of this emerging field. In science today, the major focus of research and development in synthetic materials and spectroscopic analysis broadly deals with materials on the atomic and molecular scales. The vision for the future is to move beyond these already existing applications and explore new realms of electronic applications.

The Fundamentals of Structural Integrity and Failure

Richard M. Wilcox

In series: Construction Materials and Engineering
Publication Date: 11/04/2020
277 pp.
Hardcover: 978-1-53618-778-6. $195.00
e-book: 978-1-53618-826-4. $195.00

The Fundamentals of Structural Integrity and Failure provides a comprehensive review of spent nuclear fuel integrity and the research work which has been carried out in the important area of spent nuclear fuel integrity management. Additionally, the authors review the key aspects of fatigue crack nucleation and the fracture mechanics of short- and long-crack growth, with emphasis on achieving total fatigue life prediction. The fundamental aspects of mathematical modeling, computation, measurement, and signal processing involved in the process of integrity assessment of engineering structures in the presence of uncertainty are presented.

Following this, several proposed techniques for the detection of the defects in ferromagnetic steel components are analyzed. One of these possible approaches is based on the additional magnetization of the inspected zone to minimize magnetic heterogeneity, and another trend is concerned with new selective Eddy current probe development. The capabilities of nondestructive testing techniques based on coercive force measurements concerned with several new applications are discussed.

This concluding work demonstrates the use of a judicious and effective method for detecting pressure vessel failures, applying Wiener filter concepts to noisy signals.
Underwater Vehicles: Design and Applications
George M. Roman
In series: Robotics Research and Technology
Publication Date: 12/22/2020
109 pp.
Softcover: 978-1-53618-876-9, $82.00
e-book: 978-1-53618-967-4, $82.00
Underwater Vehicles: Design and Applications first explores the application of the adaptive Kalman filter algorithm to the estimation of high speed autonomous underwater vehicle dynamics. The authors investigate the performances of different control schemes, from non-model-based to model-based and adaptive model-based, implemented on a low-inertia underwater vehicle for three-dimensional helical trajectory tracking. Control laws for collision avoidance in three-dimensional environments are introduced, considering scenarios where a vehicle detects arbitrarily shaped and nonconvex obstacles using sensors.

Unmanned Aerial Vehicles
Nicholas Barrera
In series: Robotics Research and Technology
Publication Date: 12/02/2020
247 pp.
Hardcover: 978-1-53618-900-1, $195.00
e-book: 978-1-53618-940-7, $195.00
Unmanned Aerial Vehicles presents concepts important to any individual endeavoring to use unmanned aerial vehicles in work or research for the first time. The capability of using unmanned aerial vehicles in performing atmospheric chemical measurements and in the design of sensor and sampling payloads is discussed, and a review of recent trends is provided. The authors explore the concept of a universal flight and navigation system for small and ultra-small unmanned aerial vehicles with open architecture both in hardware and software terms. The closing study details unmanned aerial vehicle photogrammetry, its idiosyncrasies, and its applicability in the conservation of archaeological objects.

TRANSPORTATION

Autonomous Vehicles: Safety, Deployment and Effect on Infrastructure
Nyle Phillips
In series: Transportation Issues, Policies and R&D
Publication Date: 12/30/2020
287 pp.
Hardcover: 978-1-53619-010-6, $195.00
e-book: 978-1-53619-069-4, $195.00
Fully autonomous vehicles, which would carry out many or all of their functions without the intervention of a driver, may someday bring sweeping social and economic changes and “lead to breakthrough gains in transportation safety.” At present, no fully autonomous vehicles are available for public use. Many new vehicles have automated some driver functions, but all require a human to monitor the driving environment and control the vehicle. However, rapid advances in technology have made it likely that vehicles with high levels of automation will be on the market within a few years, raising questions about the adequacy of existing methods of safety as discussed in chapter 1. For this and other reasons, federal oversight of the testing and deployment of autonomous vehicles has been of considerable interest as reported in chapters 2 and 3. Chapter 4 examines the implications of autonomous vehicles on America’s roadway infrastructure.
Arachis hypogaea: Cultivation, Production and Nutritional Value
Richard J. Whitworth
In Series: Agriculture Issues and Policies
Expected Publication Date: 06/15/2021
249 pp.
Hardcover: 978-1-53619-386-2 $ 160.00
e-book: 978-1-53619-504-0 $ 160.00
Arachis hypogaea L., commonly known as the groundnut or peanut, is a versatile legume that is grown primarily for its edible seeds and is consumed worldwide. Groundnut requires a warm growing season with well distributed rainfall, and India and China are responsible for providing just over half of the world’s supply. However, in most African countries, groundnut is grown on marginal soil under low input and requires the attention of researchers and policy makers. Accordingly, the first two chapters of this monograph detail the cultivation, breeding, and nutritional value of groundnut. Chapter 3 deals with the management of peanut diseases, focusing specifically on the use of azoxystrobin plus benzovindiflupyr as a fungicide for treatment of early leaf spot, peanut pod rot, and other issues. Chapter 4 details how stored peanuts can be protected from fungi and aflatoxins contamination using free and microencapsulated 2(3)-tert-butyl-4 hydroxyanisole (BHA).

Biochemistry

Biochemical Studies on Some Biomarkers of Xenobiotic Exposure
Vivek Kumar Gupta (Senior Research Fellow-ICMR, Department of Biochemistry, University of Allahabad, U.P., India) and Prof. Bechan Sharma (Professor of Biochemistry (Cadre), Department of Biochemistry, University of Allahabad, U.P., India)
In Series: Biochemistry Research Trends
Expected Publication Date: 06/15/2021
227 pp.
Hardcover: 978-1-53619-381-7 $ 160.00
e-book: 978-1-53619-500-2 $ 160.00
Pesticides belonging to carbamate and organophosphate groups have the potential to induce oxidative stress. However, the role of aqueous extract of A. vera has not been properly studied to demonstrate its ameliorative potential against the toxicity induced by these pesticides in single and combination in different organs of mammalian systems. After an extensive literature survey on the subject, an endeavor has been made to define the following objectives in order to fill up the existing lacuna of information about cartap and malathion induced oxidative stress in rat blood, brain and liver and its impact on neurotransmission as well as energy metabolism. Liver and blood were also included in this study for establishing a more meaningful agreement. The present study was therefore undertaken to delineate the differential impacts of cartap and malathion on the biochemical and histological parameters in Wistar rats. In addition, the prophylactic effect of aqueous extract of A. vera leaves has also been evaluated.

The objectives of the present study include: evaluation of xenobiotic-induced oxidative stress, determination of activity of acetylcholinesterase and other esterases in the brains of rats exposed to xenobiotics as potential biomarkers of neurotoxicity; evaluation of different enzymes of energy metabolism in rats exposed to xenobiotics; measurement of specific parameters concerning the function of the kidney and liver in rats exposed to xenobiotics; evaluation of AChE isozyme profile to specifically understand the target of xenobiotics in the brain of rats; analysis of patterns of major biomolecules (proteins/DNA) in rats exposed to xenobiotics for different treatment durations; and assessment of the ameliorative impact of phytochemicals, if any, on xenobiotics.

This book is divided into eight sections. Section 1 contains the general introduction and background of the study. Section 2 contains an extensive literature survey on the subject so as to present updated information. Section 3 demonstrates the main objectives of the study. Section 4 describes the various experimental designs, procedures, protocols, tools and techniques. Section 5 illustrates the data obtained from this study. Section 6 enumerates the discussion of the data and associated mechanisms. Section 7 includes the summary and conclusion of the entire study. Section 8 includes citations and references used in this work. This book contains many specific diagrams, illustrations and presentations in simple tables.
and figures which are self-explanatory so as to make any reader well versed to this subject. In addition, specific flow charts are added to simplify the presentation.

We hope that this publication will be of great use to graduates, postgraduates, researchers and faculty members who are studying in the field of plant-based principles for alleviating pesticide toxicity and associated diseases. The tools and techniques explained in this title could be of immense use to all those working in this area. The authors welcome comments and suggestions to improve the quality of the content in the next edition.

Glycome: The Hidden Code in Biology

Dipak K. Banerjee, Ph.D.

In Series: Biochemistry Research Trends

Expected Publication Date: 06/05/2021

Hardcover: 978-1-53619-377-0 $ 230.00

e-book: 978-1-53619-437-1 $ 230.00

Glycome: The Hidden Code in Biology

Description: “Glycome: The Hidden Code in Biology” addresses one of the most fundamental questions in biology today. The book targets readers with little expertise as well as the experts in Glycosciences.

Sugars are electroneutral. However, linking sugars to sugars, or attaching sugars to proteins or lipids changes the structural and functional identities of the glycoconjugate, and enables to form cellular networks of 4Gs [i.e., glycoproteins (N-linked or O-linked), glycosphingolipids, proteoglycans and glycosaminoglycans (GAGs)]. These glycans (i) support growth, proliferation and differentiation of cells and tissues; (ii) protect cells from foreign invasions including bacteria, viruses, parasites as well as from changes in the extracellular environment; (iii) act as biomarkers and participate in transmembrane signaling. The glycans are not ubiquitous but they are tissue/species specific.

Structurally, the glycans are diverse, and form linear to highly branched structures. This diversity is present not only across the species but also within cells of the same species, i.e., the glycoforms. Nuclear magnetic resonance (NMR) and mass spectrometric (MS) studies (i.e., Glycomics) have evaluated and contributed significantly in delineating the structural diversity of glycans. Glycomics, in fact, has helped in overcoming many earlier technological barriers which were otherwise very laborious and time consuming. Plant lectins being carbohydrate binding proteins with a high degree of sugar specificity have been useful tools to characterize the carbohydrate structures they recognize.

The glycan structures complement their biosynthetic processes. Because of the highly compartmentalized nature of the process, the glycans move between compartments during their assembly. This is believed to be mediated by vesicular structures but the participation of exosomes cannot be ruled out.

A large number of genetic disorders [gangliosidosis, mucopolysaccharidoses, congenital disorders of glycosylation (CDG)] are due to abnormal glycan synthesis or degradation. Disproportionate expression of glycans is also found in diseases like cancer, neurological disorders, diabetes, metabolic syndromes, and infection. This raises questions about the regulatory principle(s) in glycan biosynthesis.

There is no template for glycan chain synthesis, elongation, processing or termination. The cells/tissues follow a highly conserved mechanism. The assumption is glycosylation uses donor and acceptor interactions as the driving force. Increased or decreased synthesis of glycans in response to the environmental change influence cell function, i.e., growth, survival or death favor of a "push-pull" hypothesis. In the absence of a genetic code for sugars, the assembly as well as the processing of glycan chains are controlled by the Glycome. Unlike the genome, the Glycome is hidden for the normal eye but its communication skills with the cellular microenvironment and genome for glycan synthesis and degradation are enormous.

Seventeen chapters in the book are dedicated to walk the readers through the diversities of the Glycome. The authors have used mammalian, microbial and plant systems to achieve the desired goal.
Oracle SQL for Secure Relational Databases

Dr. Richard Earp (Professor Emeritus, Computer Science, University of West Florida, Pensacola, FL, USA) and Sikha Bagui (Professor, Computer Science, University of West Florida, Pensacola, FL, USA)

In Series: Computer Science, Technology and Applications

Expected Publication Date: 04/15/2021

185 pp.

Softcover: 978-1-53619-436-4 $ 95.00
e-book: 978-1-53619-480-7 $ 95.00

A typical Oracle database has multiple users working simultaneously. Data is shared amongst the users, and this of course leads to security concerns. This book comes in from the angle of developing and maintaining a secure Oracle database with multiple users. The book shows how data can be shared in an orderly fashion and what a good secure database is. In this book, we assume that you are acquainted with basic Oracle SQL and fundamentals of relational database.
Earth Sciences

Geology

Recent Developments in Geomorphology Research
Ronald M. Reale

In Series: Earth Sciences in the 21st Century
Expected Publication Date: 06/15/2021
100 pp.
Softcover: 978-1-53619-445-6 $ 82.00
e-book: 978-1-53619-506-4 $ 82.00

Geomorphology is defined as the study of the physical features of the surface of the earth and their relation to its geological structures. Geomorphology is useful not only for understanding the surface evolution of Earth, but of other solid planetary bodies as well. This monograph comprises three chapters, each detailing a specific recent development in geomorphology research. Chapter 1 describes the geomorphology of the Campo de Calatrava Volcanic Field in Central Spain, focusing on its volcanoes and the interference that any volcanic activity has produced in other forms of modeling and quaternary deposits. Chapter 2 analyzes the triggering of snow avalanches in the middle mountains of the Asturian Central Massif and their morphogenetic role in the dynamics and modeling of its slopes, a phenomenon that is impacted by the changing global climate. Chapter 3 analyzes the former fluvial erosion on Mars, adopting a model called SIMWE (SIMulated Water Erosion) to recreate the geomorphological features observed on the planet today in an effort to understand its ancient climatic conditions.

Environmental Sciences

Air Pollution and Industrial Hygiene

The Caucasus and Iran: Hydrocarbons Perspectives and Impacts on the Modern World
Khatuna Tabagari (Senior Researcher, Institute for the Research of Economic and Social Problems of Globalization, European University, Tbilisi, Georgia)
Edited by Alexander G. Tvalchrelidze (Professor, Academician, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia)

In Series: Climate Change and its Causes, Effects and Prediction
Expected Publication Date: 06/05/2021
181 pp.
Softcover: 978-1-53619-382-4 $ 95.00
e-book: 978-1-53619-429-6 $ 95.00

The consumption of oil and gas increases annually. In 2019 the share of oil was 33.1% and that of gas – 24.2% in the entire world energy consumption. During the first period of the COVID-19 coronavirus pandemic, oil markets crashed and oil prices were governed by the number of world infection cases; the more people were infected, the less the oil prices were. However, after April 2020 the usual peculiarities started to restore. It is forecasted that, at least until 2040, the share of hydrocarbons in world energy consumption will remain stable, if not increase. Energy security and energy policy of any developed country represents a key issue for sustainable development. Thus, countries with a lack of hydrocarbon resources search for ensured sources of oil and gas. From this point of view, the vulnerable situation is characteristic for the EU, the energy security of which is entirely determined by Russian gas supply. However, the Ukraine-Russia “gas wars” in 2006 and 2009 have demonstrated that energy supply schedules to Europe should be diversified. From this point of view, neither the Nord Stream Pipeline nor the Southern Gas Corridor will solve the problem, mainly due to the resource deficit in Azerbaijan.

In-depth analysis of Iran’s economy and political structure demonstrates that: (i) the country’s welfare is entirely determined by oil exports; (ii) having the second world rank in gas reserves, Iran is exporting only an insignificant amount of gas; (iii) all attempts of President Rouhani to introduce free market relations in the country and to create hope for a better future failed due to U.S. sanctions; (iv) the latter resulted in just the opposite effect they aimed to achieve: they were unable to reduce oil exports from Iran to zero but, on the contrary, created the shadow oil exports totally controlled by the Revolutionary Guard Corp; (v) the sole possibility to provoke democratic development in Iran and to cancel financing of terrorist organizations via diminishing the role of ecclesiastic leaders is the involvement of the country in international energy transit projects governed by the rule of law. The energy transit projects are unfeasible without the involvement of Georgia, which will become the Eurasian energy hub. This book describes these projects in detail. Implementation of these projects will (i) diminish the role of Russia in the EU energy market; (ii) ensure stability in the South Caucasus region, and (iii) provoke democratic reforms in Iran and this way sustainably increase world stability and security.
Human activities extensively contribute to various types of wastewater. These include domestic, industrial, agricultural and storm water. Depending on the waste, they consist of organic material, inorganic material, nitrates, phosphates and metals. Conventional methods of wastewater treatment incorporate various stages, screening, a biological treatment process involving the formation of coagulates, gravity separator, and a clarifier to remove remaining suspended solids. This is further treated using oxidizing and disinfecting agents to reduce the biochemical oxygen demand (BOD) levels. Chemicals such as chlorine are added to bring the water quality to required levels. Biological treatment systems currently being employed in industry include membrane bioreactor (MBR) and moving bed bioreactor (MBBR), which are followed by ultrafiltration treatment.

Conventional wastewater treatment methods are expensive. One technology that has been researched and found to have potential are constructed wetlands (CWs). Wetlands are ecosystems that consist of a variety of biodiversity of aquatic plants and microorganisms. Wetlands act like filters that break down waste from water. Constructed wetlands are engineered wetlands that mimic natural wetlands that consist of a gravel bed through which wastewater flows. As the wastewater passes through the gravel it encounters a natural system comprising of microbiological activity, phytoremediation and filtration. Indigenous plant species are used to promote biodiversity. Plants and bacteria utilize certain components of these pollutants and in this way clean up the wastewater. Due to this ability of remediating polluted water, they are usually used in both secondary and tertiary treatment processes. This is the case in constructed wetlands and wastewater treatment plants. Often this remediation is achieved through biosorption and sequestration mechanisms and sometimes biominerallization may occur if these pollutants can be incorporated into biochemical pathways. But overall the COD is significantly reduced in the polluted water. The biochemical route may involve plant and microbial participation in the carbon, nitrogen and sulphur cycles by transforming them and releasing them into the atmosphere.

Natural wetlands, constructed wetlands, and wastewater treatment plants fail in time and this is demonstrated by clogging, which occurs as a result of build-up of sediments and precipitates in wetland beds, thus constituting reductions in physical media permeability and hydraulic conductivity of water. In natural wetlands it is associated with the aging process of the water body. However, this is more rapidly indicated in constructed wetlands causing a system failure, because of organic and inorganic matter settling at the bottom, thereby slowly filling up the system and causing a decrease in dissolved oxygen levels as decomposition takes place. This phenomenon can be referred to as eutrophication. Normally, clogging and sludge bulking in wetlands can be likened to the phenomenon of eutrophication, sometimes with associated foaming in conventional wastewater treatment. Clogging not only contributes to systems failure in natural and constructed wetlands but it also reduces operational efficiency reducing the ability of resident organisms to biodegrade pollutants. This book will provide a holistic overview of natural wetlands and possible reasons for system failure in constructed wetlands.
Biology / Botany

Aromatic Plants: The Technology, Human Welfare and Beyond
Dr. Amit Baran Sharangi (Department of Plantation, Spices, Medicinal and Aromatic Crops, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India)

In Series: Plant Science Research and Practices
Expected Publication Date: 05/25/2021
386 pp.
Hardcover: 978-1-53619-322-0 $ 230.00
e-book: 978-1-53619-398-5 $ 230.00

The history of aroma and fragrance dates back through several ages and civilizations. The sagacity of smell plays a remarkable role for human beings to recognize food. Best fruits can be judged when they are ripe and fit for consumption emitting lovely smell or aroma. The same attribute from flowers attracts insects leading to cross-pollination. India has enjoyed a paramount place in the fabrication of quality perfumes and aromatics since the prehistoric era. The celebrated Chinese voyager Fa-Hien described India as the land of aromatic plants. Indian cities like Delhi, Agra, Kannauj, Lucknow, Jaipur, Ghazipur, Aligarh, Bharatpur, Mysore, and Hyderabad emerged as centers of national and international trade in perfumery and other aromatic compounds, and were known for their quality across Asia, Europe and Africa. Aromatic plants precisely possess odorous volatile substances in root, wood, bark, stem, foliage, flower and fruit. The typical aroma is due to an assortment of composite chemical compounds. At present, information on the chemistry and properties of essential oils of only about 500 aromatic plants species is known in some detail out of a total of about 1500. Of these, about 50 species find use as commercial source of essential oils and aroma chemicals. It is realized now that perfumes are not the essentials of sumptuousness as they were in the past. It has given birth to new streams of medicinal therapy, aromatherapy, involving the use of essential oils and aromatics derived from plants to treat diseases. Essential oils are also reported to be better than antibiotics due to their safety and broad-spectrum activity. Natural essential oils are also potentially safe insecticides. The essential oil obtained from Acorus calamus having ß-asarone as an active principle produces sterility among a variety of insects of either sex. It has, therefore, been found very useful and secure for the storage of food grains. However, there is still very inadequate research for the cultivation of aromatic crops and extraction of essential oils across the globe.

This book has been designed to highlight the associated issues of aromatic plants including the aspects of their classification, importance, uses and applications for human wellbeing, botany, agrotechniques, major bioactive constituents, post-harvest extraction, chemistry and biochemistry of aroma compounds along with an informative modern global research on these plants throughout the world. I hope this book will cater the scholastic services, reward diverse professionals and stakeholders, and serve as an informative handbook for theoretical as well as practical purposes.

Elementary Botany
George Francis Atkinson

In Series: Botanical Research and Practices
Expected Publication Date: 05/03/2021
640 pp.
Hardcover: 978-1-53619-448-7 $ 310.00
e-book: 978-1-53619-518-7 $ 310.00

Part I, Physiology, deals with the life processes of plants, such as absorption, transpiration, conduction, photosynthesis, nutrition, assimilation, digestion, respiration, growth, and irritability.
Part II, Morphology and Life History of Representative Plants, includes a rather careful study of representative examples among the algae, fungi, liverworts, mosses, ferns and their allies, gymnosperms and angiosperms, with especial emphasis on the form of plant parts, and a comparison of them in the different groups, with a comparative study of development, reproduction, and fertilization, rounding out the work with a study of life histories and noting progression and retrogression of certain organs and phases in proceeding from the lower to the higher plants.
Part III, Plant Members in Relation to Environment, deals with the organization of the plant body as a whole in its relation to environment, the organization of plant tissues with a discussion of the principal tissues and a descriptive synopsis of the same.

Biology / Zoology

Our Vanishing Wild Life: Its Extermination and Preservation
William T. Hornaday

In Series: Historical Manuscripts
Expected Publication Date: 05/03/2021
505 pp.
Hardcover: 978-1-53619-451-7 $ 270.00
Written by natural historian William Temple Hornaday and originally published in 1913, Our Vanishing Wild Life: Its Extermination and Preservation argues passionately for the importance of taking every possible effort to preserve and protect the natural world and all its animal and plant inhabitants, a theme that resonates to this day.

Mathematics and Statistics

Applied Mathematics

Research in Mathematics at Cameron University

Ioannis K. Argyros (Professor, Department of Mathematical Sciences, Cameron University, Lawton, OK, USA), Samundra Regmi (Independent Researcher and Professional Mathematics Tutor, Learning Commons, University of North Texas at Dallas, Dallas, TX, USA), Janak Joshi (Assistant Professor, Department of Mathematical Sciences, Cameron University, Lawton, OK, USA) and Parshuram Budhathoki (Assistant Professor, Math Department, Broward College, Pembroke Pines, FL, USA)

In Series: Mathematics Research Developments

Expected Publication Date: 05/25/2021

437 pp.

Hardcover: 978-1-53619-417-3 $ 230.00

e-book: 978-1-53619-505-7 $ 230.00

Numerous problems from diverse disciplines can be converted using mathematical modeling to an equation defined on suitable abstract spaces usually involving the n-dimensional Euclidean space or Hilbert space or Banach Space or even more general spaces. The solution of these equations is sought in closed form. But this is possible only in special cases. That is why researchers and practitioners use iterative algorithms, which seem to be the only alternative. Due to the explosion of technology, faster and faster computers become available. This development simply means that new optimized algorithms should be developed to take advantage of these improvements. That is exactly where we come in with our book containing such algorithms with applications in problems from numerical analysis and economics but also from other areas such as biology, chemistry, physics, parallel computing, and engineering. The book is an outgrowth of scientific research conducted over two years. This book can be used by senior undergraduate students, graduate students, researchers, and practitioners in the aforementioned areas in the classroom or as reference material. Readers should know the fundamentals of numerical-functional analysis, economic theory, and Newtonian physics. Some knowledge of computers and contemporary programming shall be very helpful to readers.

General Mathematics

Fixed Point Theory and its Applications to Real World Problems

Professor Anita Tomar
Professor M. C. Joshi

In Series: Mathematics Research Developments

Expected Publication Date: 06/15/2021

Hardcover: 978-1-53619-336-7 $ 230.00

e-book: 978-1-53619-479-1 $ 230.00

Fixed-point theory initially emerged in the article demonstrating existence of solutions of differential equations, which appeared in the second quarter of the 18th century (Joseph Liouville, 1837). Later on, this technique was improved as a method of successive approximations (Charles Emile Picard, 1890) which was extracted and abstracted as a fixed-point theorem in the framework of complete normed space (Stefan Banach, 1922). It ensures presence as well as uniqueness of a fixed point, gives an approximate technique to really locate the fixed point and the a priori and a posteriori estimates for the rate of convergence. It is an essential device in the theory of metric spaces. Subsequently, it is stated that fixed-point theory is initiated by Stefan Banach. Fixed-point theorems give adequate conditions under which there exists a fixed point for a given function and enable us to ensure the existence of a solution of the original problem. In an extensive variety of scientific issues, beginning from different branches of mathematics, the existence of a solution is comparable to the existence of a fixed point for a suitable mapping.

The book “Fixed Point Theory & its Applications to Real World Problems” is an endeavour to present results in fixed point theory which are extensions, improvements and generalizations of classical and recent results in this area and touches on distinct research directions within the metric fixed-point theory. It provides new openings for further exploration and makes for an easily accessible source of knowledge. This book is apposite for young researchers who want to pursue their research in fixed-point theory and is the latest in the field, giving new techniques for the existence of a superior fixed point,
a fixed point, a near fixed point, a fixed circle, a near fixed interval circle, a fixed disc, a near fixed interval disc, a coincidence point, a common fixed point, a coupled common fixed point, amiable fixed sets, strong coupled fixed points and so on, utilizing minimal conditions. It offers novel applications besides traditional applications which are applicable to real world problems. The book is self-contained and unified which will serve as a reference book to researchers who are in search of novel ideas. It will be a valued addition to the library.

**Optimized Iterative Methods with Applications in Diverse Disciplines**

*Samundra Regmi*

In Series: *Mathematics Research Developments*

Expected Publication Date: 06/15/2021

Hardcover: 978-1-53619-351-0 $ 230.00
e-book: 978-1-53619-508-8 $ 230.00

Numerous problems from diverse disciplines can be converted using mathematical modeling to an equation defined on suitable abstract spaces usually involving the n-dimensional Euclidean space, Hilbert space, Banach Space or even more general spaces. The solution of these equations is sought in closed form. But this is possible only in special cases. That is why researchers and practitioners use iterative algorithms, which seem to be the only alternative.

Due to the explosion of technology, faster and faster computers become available. This development simply means that new optimized algorithms should be developed to take advantage of these improvements. That is exactly where we come in with our book containing such algorithms with applications in problems from numerical analysis and economics but also from other areas such as biology, chemistry, physics, parallel computing, and engineering. The book is an outgrowth of scientific research conducted over two years.

This book can be used by senior undergraduate students, graduate students, researchers, and practitioners in the aforementioned areas in the classroom or as reference material. Readers should know the fundamentals of numerical-functional analysis, economic theory, and Newtonian physics. Some knowledge of computers and contemporary programming shall be very helpful to readers.

**Mathematical Analysis**

**Decision-Making with Neutrosophic Set: Theory and Applications in Knowledge Management**

*Dr. Harish Garg*

In Series: *Computational Mathematics and Analysis*

Expected Publication Date: 06/25/2021

Hardcover: 978-1-53619-419-7 $ 230.00
e-book: 978-1-53619-522-4 $ 230.00

This book introduces readers to the concept of the neutrosophic set which can deal with dynamic and complex decision-making problems. With the complexity of the socio-economic environment, today's decision-making is one of the most notable ventures, whose mission is to decide the best alternative under numerous known or unknown criteria. This book provides a large amount of theoretical and practical information about the latest research in the field, allowing readers to gain an extensive understanding of both the fundamentals and applications of neutrosophic sets to solve different kinds of decision-making problems and mathematical programming such as medical diagnosis, pattern recognition, construction problems, technology selection etc.

**Number Theory**

**The Riemann Hypothesis and the Distribution of Prime Numbers**

*Naji Arwashan, PhD, PE (Senior Specialist of Computer-Aided Engineering with the automotive industry; Former Adjunct Professor with the University of Michigan-Dearborn, Troy, MI, USA)*

In Series: *Mathematics Research Developments*

Expected Publication Date: 06/15/2021

229 pp.

Hardcover: 978-1-53619-422-7 $ 160.00
e-book: 978-1-53619-482-1 $ 160.00

This book is an introductory and comprehensive presentation of the Riemann Hypothesis, one of the most important open questions in math today. It is introductory because it is written in an accessible and detailed format that makes it easy to read and understand. And it is comprehensive because it explains and proves all the mathematical ideas surrounding and leading to the formulation of the hypothesis.

Chapter 1 begins by defining the zeta function and exploring some of its properties when the argument is a real number. It proceeds to identify the series’ domain of convergence and proves Euler’s product formula. Chapter 2 introduces complex
numbers and the complex analytic tools necessary to understand the zeta function in complex plane. Chapter 3 extends the domain of the zeta function for the first time by introducing the eta function. Presenting proofs by Sondow, it is shown that zeta can be defined for any complex number whose real part is positive. Next, the functional equation of the zeta function is derived in Chapter 4. This provides a method to extend the definition of zeta to the entirety of the complex plane. Chapter 5 is where the Riemann Hypothesis is properly introduced for the first time. It relates the zeros of the zeta and eta functions which leads to a simple formulation of the hypothesis. Chapters 6 and 7 connect the topics of zeta’s zeros and the distribution of prime numbers. Chapter 6 introduces Riemann explicit formula and explains the use of Mobius transform to rewrite the prime counting function in terms of the Riemann prime counting one and it provides a detailed numerical example on how to use the Riemann’s formula. Chapter 7 derives the von Mangoldt formula via the residue theorem and elucidates some of its important properties. Certain necessary mathematical tools, such as Fourier analysis and theta and gamma functional equations, are included in the appendices to make the chapters more concise and focused.

**Probability and Mathematical Statistics**

**Characterizations of Recently Introduced Continuous Distributions III**

*G.G. Hamedani (Professor and Editor, JSTA, Department of Mathematics, Statistics and Computer Science, Marquette University, Milwaukee, Wisconsin, USA)*

In Series: Mathematics Research Developments

Expected Publication Date: 04/10/2021

498 pp.

Hardcover: 978-1-53619-297-1 $ 270.00

e-book: 978-1-53619-472-2 $ 270.00

This monograph is, as far as the author has gathered, the third one of its kind which presents various characterizations of many important continuous distributions. It consists of two chapters. The first chapter lists cumulative distributions and probability density functions of six hundred and sixty seven newly proposed univariate continuous distributions. Chapter Two consists of four sections. Section 2.1 provides characterizations of the majority of the distributions mentioned in Chapter One, based on the ratio of two truncated moments. Section 2.2 takes up the characterizations of some of these distributions in terms of their hazard functions. Section 2.3 deals with the characterizations some of these distributions based on their reverse hazard functions. Characterizations of some of these distributions based on the conditional expectations of certain functions of the random variable are presented in Section 2.4. As pointed out in our previous Monographs (I & II), a good number of proposed distributions in this volume have already been introduced in the literature.

**Probability Theory: A Logic of Science**

*Valery B. Nevzorov (Professor of Statistics, Department of Mathematics and Mechanics, St. Petersburg State University, St. Petersburg, Russia), Mohammad Ahsanullah (Professor Emeritus, Rider University, Lawrenceville, NJ, USA) and Sergey Annanjevskiy (Associate Professor, Department of Mathematics and Mechanics, St. Petersburg State University, St. Petersburg, Russia)*

In Series: Applied Statistical Science

Expected Publication Date: 04/15/2021

249 pp.

Hardcover: 978-1-53619-173-8 $ 195.00

e-book: 978-1-53619-220-9 $ 195.00

This book is written for people who are interested to know the basics of probability theory. The basic knowledge of high school math will be enough to know the probability theory covered in the book. It covers basic theories of probability, statistical distributions, order statistics and record values, The use of characterization methods are described to identify various probability distributions. The book will be useful for undergraduate, graduate students and applied statisticians.
Physics and Astronomy

Special Topics

A Comprehensive Guide to Lamb Waves
Nitesh Prakash Yelve, Ph.D. (Department of Mechanical Engineering, Fr. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai, Maharashtra State, India)

In Series: Physics Research and Technology
Expected Publication Date: 04/15/2021
181 pp.
Softcover: 978-1-53619-418-0 $ 95.00
e-book: 978-1-53619-477-7 $ 95.00

This book presents the fundamental concept of Lamb wave propagation and its application for damage detection in metals and composites. The editor has taken utmost care to include a range of applications of Lamb waves, in the linear and nonlinear domains, in this book. Various damage location algorithms making use of linear characteristics of Lamb waves and a few case studies making use of nonlinear characteristics Lamb waves for damage detection are presented in a simple-to-understand way. Readers will find detailed descriptions for experiments, simulation, and signal processing. The last chapter that focuses on the evaluation of fatigue-induced material nonlinearity would help readers to understand the complex applications of Lamb waves. The forthcoming books in this series would include state-of-the-art applications of guided waves for damage detection, material characterization, and estimation of the remnant useful life of engineering structures.

Technology and Engineering

Materials Science

Scheelite and Zircon: Brightness, Colour and NIR Reflectance in Ceramics
Guillermo Monró (Professor, University Jaume I of Castelló, Spain)

In Series: Materials Science and Technologies
Expected Publication Date: 06/15/2021
333 pp.
Hardcover: 978-1-53619-332-9 $ 230.00
e-book: 978-1-53619-502-6 $ 230.00

The subject of this book is the analysis of the performance in ceramics of scheelite (CaWO4) and zircon (ZrSiO4). The aesthetics of glazed ceramics and paints depends to a large extent on the so-called opacifiers that give them brightness and pigments that give them color. At present, zircon ZrSiO4 is the main opacifier of industrial ceramic glazes and the base of a widely-used pigment palette (cyan of vanadium in zircon, magenta of hematite in zircon and yellow of praseodymium in zircon). Likewise, scheelite CaWO4 can be used as a good opacifier by addition to glazes and is the basis of another family of inorganic pigments. These pigments are analyzed from the perspective of their cooling capacity of buildings and urban environments, associated with their high reflectance of solar NIR radiation (700-2500 nm), as well as a certain photocatalytic capacity over organic substrates and NOx; therefore, surfaces with these pigments show a certain air purification capacity producing cleaner and cooler environments, allowing a saving in the use of air conditioning and a moderation of the so-called urban heat island effect. In short, the brightness, color and NIR reflectance for cool surfaces in paints and ceramics using scheelite and zircon chemistry are discussed.
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A Review of the Pathogeneses, Classification and Imaging of the Solitary Pulmonary Nodule
Dr. Ali Nawaz Khan

A Simple Approach to Biodiesel Production from Flaxseed Oil
Dr. Sangeeta Kanakraj and Dr. Savita Dixit

ABCs of Microbiology
Anjana K. Vala
In Series: Microbiology Research Advances

Advanced Techniques for Design of Zero Energy Buildings
Sassan Mohassem and Niloufar Ghazanfari

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Lowell T. Duncan
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Carlos Bravo Diaz
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Dr. Aman B. Upaganlawar
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In Series: Medical Procedures, Testing and Technology

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*Giuseppe Fiorentino and Antonio Esquinas*

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*Margaret Brown*
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Dr Adele Sateriano, Dr Jesús Rodrigo-Comino and Dr Luca Salvati
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