

Advanced Engineering Mathematics By Nasir

While much is known about the critical importance of educative experiences outside of school, little is known about the social systems, community programs, and everyday practices that can facilitate learning outside of the classroom. Thinking Comprehensively About Education sheds much-needed light on those systems, programs, and practices; conceptualizing education more broadly through a nuanced exploration of: the various spaces where education occurs; the non-dominant practices and possibilities of those spaces; the possibilities of enabling social systems, institutions, and programs of comprehensive education. This original edited collection identifies and describes the resources that enable optimal human learning and development, and offers a public policy framework that can enable a truly comprehensive educational system. Thinking Comprehensively About Education is a must-read for faculty, students, policy analysts, and policymakers.

In recent years significant applications of systems and control theory have been witnessed in diversified areas such as physical sciences, social sciences, engineering, management and finance. In particular the most interesting applications have taken place in areas such as aerospace, buildings and space structure, suspension bridges, artificial heart, chemotherapy, power system, hydrodynamics and computer communication networks. There are many prominent areas of systems and control theory that include systems governed by linear and nonlinear ordinary differential equations, systems governed by partial differential equations including their stochastic counter parts and, above all, systems governed by abstract differential and functional differential equations and inclusions on Banach spaces, including their stochastic counterparts. The objective of this book is to present a small segment of theory and applications of systems and control governed by ordinary differential equations and inclusions. It is expected that any reader who has absorbed the materials presented here would have no difficulty to reach the core of current research.

55% new material in the latest edition of this “must-have for students and practitioners of image & video processing! This Handbook is intended to serve as the basic reference point on image and video processing, in the field, in the research laboratory, and in the classroom. Each chapter has been written by carefully selected, distinguished experts specializing in that topic and carefully reviewed by the Editor, Al Bovik, ensuring that the greatest depth of understanding be communicated to the reader. Coverage includes introductory, intermediate and advanced topics and as such, this book serves equally well as classroom textbook as reference resource.

- Provides practicing engineers and students with a highly accessible resource for learning and using image/video processing theory and algorithms
- Includes a new chapter on image processing education, which should prove invaluable for those developing or modifying their curricula
- Covers the various image and video processing standards that exist and are emerging, driving today’s explosive industry
- Offers an understanding of what images are, how they are modeled, and gives an introduction to how they are perceived
- Introduces the necessary, practical background to allow engineering students to acquire and process their own digital image or video data
- Culminates with a diverse set of applications chapters, covered in

sufficient depth to serve as extensible models to the reader's own potential applications About the Editor... Al Bovik is the Cullen Trust for Higher Education Endowed Professor at The University of Texas at Austin, where he is the Director of the Laboratory for Image and Video Engineering (LIVE). He has published over 400 technical articles in the general area of image and video processing and holds two U.S. patents. Dr. Bovik was Distinguished Lecturer of the IEEE Signal Processing Society (2000), received the IEEE Signal Processing Society Meritorious Service Award (1998), the IEEE Third Millennium Medal (2000), and twice was a two-time Honorable Mention winner of the international Pattern Recognition Society Award. He is a Fellow of the IEEE, was Editor-in-Chief, of the IEEE Transactions on Image Processing (1996-2002), has served on and continues to serve on many other professional boards and panels, and was the Founding General Chairman of the IEEE International Conference on Image Processing which was held in Austin, Texas in 1994. * No other resource for image and video processing contains the same breadth of up-to-date coverage * Each chapter written by one or several of the top experts working in that area * Includes all essential mathematics, techniques, and algorithms for every type of image and video processing used by electrical engineers, computer scientists, internet developers, bioengineers, and scientists in various, image-intensive disciplines

This book presents the proceedings of the First National Conference on Sustainable Management of Environment & Natural Resource through Innovation in Science and Technology (SMTST2020). The book highlights the latest development and innovations in the fields of sustainability, natural resource management, ecology and its environmental fields, geosciences and geology, atmospheric sciences, sustainability, climate change, and extreme weather, global warming, and global change, the effect of climate change on the ecosystem, environment, and pollution, as well as putting a strong emphasis on the multidisciplinary studies.

This book presents the proceedings of the 5th International Conference on Electrical, Control & Computer Engineering 2019, held in Kuantan, Pahang, Malaysia, on 29th July 2019. Consisting of two parts, it covers the conferences' main foci: Part 1 discusses instrumentation, robotics and control, while Part 2 addresses electrical power systems. The book appeals to professionals, scientists and researchers with experience in industry. The conference provided a platform for professionals, scientists and researchers with experience in industry.

This is the first volume of the Biographical Dictionary of South Sudan, an ongoing research project begun in July 2001. As the subtitle of the book, the Notable Firsts, suggests, this volume is primarily concerned with historically significant South Sudanese personalities, deceased and contemporary alike, and their illustrious careers. Luminaries from all walks of life are featured, including politics, traditional leadership, civil service, academia, and sports. This book has several main aims. Its primary aim is historical. It presents biographical profiles or accounts of the entrants and highlights the accomplishments and contributions of entrants in their respective fields of expertise or in the public sphere. But the aim of this study is not only to preset entrants' biographies. It is mostly to place the entries in a broader historical perspective. The biographical dictionary, though concerned about personal accounts of entrants, it discusses pivotal events that shaped the history of South Sudan. The biographies are

essentially linked to historical events that shaped or influenced the country's trajectory throughout the period in question. Central to understanding the history of South Sudan is the biographical information of personalities who have taken part in major events or who have assumed important offices in the country.

The book comprises papers presented at the 7th International Conference on University Learning and Teaching (InCULT) 2014, which was hosted by the Asian Centre for Research on University Learning and Teaching (ACRULeT) located at the Faculty of Education, Universiti Teknologi MARA, Shah Alam, Malaysia. It was co-hosted by the University of Hertfordshire, UK; the University of South Australia; the University of Ohio, USA; Taylor's University, Malaysia and the Training Academy for Higher Education (AKEPT), Ministry of Education, Malaysia. A total of 165 papers were presented by speakers from around the world based on the theme "Educate to Innovate in the 21st Century." The papers in this timely book cover the latest developments, issues and concerns in the field of teaching and learning and provide a valuable reference resource on university teaching and learning for lecturers, educators, researchers and policy makers.

Foundations of Embodied Learning advances learning, instruction, and the design of educational technologies by rethinking the learner as an integrated system of mind, body, and environment. Body-based processes—direct physical, social, and environmental interactions—are constantly mediating intellectual performance, sensory stimulation, communication abilities, and other conditions of learning. This book's coherent, evidence-based framework articulates principles of grounded and embodied learning for design and its implications for curriculum, classroom instruction, and student formative and summative assessment for scholars and graduate students of educational psychology, instructional design and technology, cognitive science, the learning sciences, and beyond.

Fractional-order calculus dates to the 19th century but has been resurrected as a prevalent research subject due to its provision of more adequate and realistic descriptions of physical aspects within the science and engineering fields. What was once a classical form of mathematics is currently being reintroduced as a new modeling technique that engineers and scientists are finding modern uses for. There is a need for research on all facets of these fractional-order systems and studies of its potential applications. Advanced Applications of Fractional Differential Operators to Science and Technology provides emerging research exploring the theoretical and practical aspects of novel fractional modeling and related dynamical behaviors as well as its applications within the fields of physical sciences and engineering. Featuring coverage on a broad range of topics such as chaotic dynamics, ecological models, and bifurcation control, this book is ideally designed for engineering professionals, mathematicians, physicists, analysts, researchers, educators, and students seeking current research on fractional calculus and other applied mathematical modeling techniques.

In an era of ever increasing anti-immigrant sentiment and in the face of the worst economic recession since the great

depression, this book presents a timely, compassionate and often moving glimpse into the lives of second generation children of immigrants in urban schools.

This book constitutes the refereed proceedings of the First International Conference on Advanced Research in Technologies, Information, Innovation and Sustainability, ARTIIS 2021, held in La Libertad, Ecuador, in November 2021. The 53 full papers and 2 short contributions were carefully reviewed and selected from 155 submissions. The volume covers a variety of topics, such as computer systems organization, software engineering, information storage and retrieval, computing methodologies, artificial intelligence, and others. The papers are logically organized in the following thematic blocks: Computing Solutions; Data Intelligence; Ethics, Security, and Privacy; Sustainability.

The book combines both rigor and intuition to derive most of the classical results of linear and nonlinear filtering and beyond. Many fundamental results recently discovered by the author are included. Furthermore, many results that have appeared in recent years in the literature are also presented. The most interesting feature of the book is that all the derivations of the linear filter equations given in Chapters 3–11, beginning from the classical Kalman filter presented in Chapters 3 and 5, are based on one basic principle which is fully rigorous but also very intuitive and easily understandable. The second most interesting feature is that the book provides a rigorous theoretical basis for the numerical solution of nonlinear filter equations illustrated by multidimensional examples. The book also provides a strong foundation for theoretical understanding of the subject based on the theory of stochastic differential equations.

Contents: Introduction to Stochastic Processes Stochastic Differential Equations Kalman Filtering for Linear Systems Driven by Wiener Process I Kalman Filtering for Linear Systems Driven by Wiener Process II Discrete Kalman Filtering Linear Filtering with Correlated Noise I Linear Filtering with Correlated Noise II Linear Filtering with Correlated Noise III Linear Filtering of Jump Processes Linear Filtering with Constraints Filtering for Linear Systems Driven by Second Order Random Processes Extended Kalman Filtering I, II and III Nonlinear Filtering Numerical Techniques for Nonlinear Filtering Partially Observed Control System Identification Readership: Researchers in analysis & differential equations, applied mathematics, probability & statistics, numerical & computational methods, statistical physics, engineering, chaos/dynamical systems and economics/finance. Keywords: Stochastic Systems; Kalman Filtering; Nonlinear Filtering; Jump Processes; Identification; Numerical Techniques Reviews: "... many new results, especially on nonlinear filtering problems and their numerical techniques, are included in book form for the first time ... it will serve as a useful reference book on the recent progress in this field. The book can be used for teaching graduate courses to students in mathematics, probability, statistics, and engineering. And finally, doctoral students and young researchers in the area of filtering theory and its applications can find inspiring ideas and techniques." Journal of Applied Mathematics and

Stochastic Analysis

This two-volume set (CCIS 152 and CCIS 153) constitutes the refereed proceedings of the International Conference on Computer Science and Information Engineering, CSIE 2011, held in Zhengzhou, China, in May 2011. The 159 revised full papers presented in both volumes were carefully reviewed and selected from a large number of submissions. The papers present original research results that are broadly relevant to the theory and applications of Computer Science and Information Engineering and address a wide variety of topics such as algorithms, automation, artificial intelligence, bioinformatics, computer networks, computer security, computer vision, modeling and simulation, databases, data mining, e-learning, e-commerce, e-business, image processing, knowledge management, multimedia, mobile computing, natural computing, open and innovative education, pattern recognition, parallel computing, robotics, wireless networks, and Web applications.

Throughout the industry, financial institutions seek to eliminate cumbersome authentication methods, such as PINs, passwords, and security questions, as these antiquated tactics prove increasingly weak. Thus, many organizations now aim to implement emerging technologies in an effort to validate identities with greater certainty. The near instantaneous nature of online banking, purchases, transactions, and payments puts tremendous pressure on banks to secure their operations and procedures. In order to reduce the risk of human error in financial domains, expert systems are seen to offer a great advantage in big data environments. Besides their efficiency in quantitative analysis such as profitability, banking management, and strategic financial planning, expert systems have successfully treated qualitative issues including financial analysis, investment advisories, and knowledge-based decision support systems. Due to the increase in financial applications' size, complexity, and number of components, it is no longer practical to anticipate and model all possible interactions and data processing in these applications using the traditional data processing model. The emergence of new research areas is clear evidence of the rise of new demands and requirements of modern real-life applications to be more intelligent. This book provides an exhaustive review of the roles of expert systems within the financial sector, with particular reference to big data environments. In addition, it offers a collection of high-quality research that addresses broad challenges in both theoretical and application aspects of intelligent and expert systems in finance. The book serves to aid the continued efforts of the application of intelligent systems that respond to the problem of big data processing in a smart banking and financial environment.

Exchange of information and innovative ideas are necessary to accelerate the development of technology. With advent of technology, intelligent and soft computing techniques came into existence with a wide scope of implementation in engineering sciences. Keeping this ideology in preference, this book includes the insights that reflect the 'Advances in Computer and Computational Sciences' from upcoming

researchers and leading academicians across the globe. It contains high-quality peer-reviewed papers of 'International Conference on Computer, Communication and Computational Sciences (ICCCCS 2016), held during 12-13 August, 2016 in Ajmer, India. These papers are arranged in the form of chapters. The content of the book is divided into two volumes that cover variety of topics such as intelligent hardware and software design, advanced communications, power and energy optimization, intelligent techniques used in internet of things, intelligent image processing, advanced software engineering, evolutionary and soft computing, security and many more. This book helps the perspective readers' from computer industry and academia to derive the advances of next generation computer and communication technology and shape them into real life applications.

This book covers recent advances in the method used in testing, especially in the case of structural integrity that includes fatigue and fracture tests, vibrations test and surface engineering tests that are extremely crucial and widely used by engineers and industries. The book will provide you with information on how to apply the advanced formulation, advanced theory and advanced method of testing that are relevant to all engineering fields: mechanical, electrical, civil, materials and surface engineering. The topics are explained comprehensively, including the reliable test that one should perform in order to effectively investigate the strength and validation of the developed theory or model. I hope that the material is not too theoretical and that the reader finds the case study, formulation, testing method and the analysis helpful for tackling their own engineering and science based studies.

What students learn about the science disciplines, technology, engineering, and mathematics during their K-12 schooling shapes their intellectual development, opportunities for future study and work, and choices of career, as well as their capacity to make informed decisions about political and civic issues and about their own lives. Most people share the vision that a highly capable STEM workforce and a population that understands and supports the scientific enterprise are key to the future place of the United States in global economics and politics and to the well-being of the nation. Indeed, the solutions to some of the most daunting problems facing the nation will require not only the expertise of top STEM professionals but also the wisdom and understanding of its citizens. Although much is known about why schools may not succeed, it is far less clear what makes STEM education effective. Successful STEM Education: A Workshop Summary discusses the importance of STEM education. The report describes the primary types of K-12 schools and programs that can support successful education in the STEM disciplines and examines data and research that demonstrate the effectiveness of these school types. It also summarizes research that helps to identify both the elements that make such programs effective and what is needed to implement these elements.

Applied Mathematics in Engineering and Reliability contains papers presented at the International Conference on Applied Mathematics in Engineering and Reliability (ICAMER 2016, Ho Chi Minh City, Viet Nam, 4-6 May 2016). The book covers a wide range of topics within mathematics applied in reliability, risk and engineering, including:- Risk and Relia

Through a study of Malaysia, Taming Babel examines how empires and postcolonial nation-states struggle to govern multilingual and polyglot subjects.

The Handbook of Mathematics for Engineers and Scientists covers the main fields of mathematics and focuses on the methods used for obtaining solutions of various classes of mathematical equations that underlie the mathematical modeling of numerous phenomena and processes in science and technology. To accommodate different mathematical backgrounds, the preeminent authors outline the material in a simplified, schematic manner, avoiding special terminology wherever possible. Organized in ascending order of complexity, the material is

divided into two parts. The first part is a coherent survey of the most important definitions, formulas, equations, methods, and theorems. It covers arithmetic, elementary and analytic geometry, algebra, differential and integral calculus, special functions, calculus of variations, and probability theory. Numerous specific examples clarify the methods for solving problems and equations. The second part provides many in-depth mathematical tables, including those of exact solutions of various types of equations. This concise, comprehensive compendium of mathematical definitions, formulas, and theorems provides the foundation for exploring scientific and technological phenomena.

The construction industry is amidst a digital transformation that is focused on addressing well-documented issues and calls for significant improvements and changes through increased productivity, whole-life value, client focus, reduction of waste, and being more sustainable. The key aspect to driving change and transformation is the education and upskilling of the required workforce towards developing the required capacities. Various approaches can be taken to embed digital construction within education and through collaborative efforts in order to drive change and facilitate improvements. The Handbook of Research on Driving Transformational Change in the Digital Built Environment focuses on current developments in practice and education towards facilitating transformation in the built environment. This book provides insight, from a practice perspective, in relation to the client's understanding, digitally enabled collaboration, interoperability and open standards, and maturity/capability. Covering topics that include digital transformation and construction, digitally enabled infrastructure, building information modelling, collaborative digital education, and the digital built environment, this book is an ideal reference source for engineers, professionals, and researchers in the field of digital transformation as well as doctoral scholars, doctoral researchers, professionals, and academicians.

The story of the men and women who drove NASA's Voyager spacecraft mission—the farthest-flung emissaries of planet Earth—told by a scientist who was there from the beginning. Voyager 1 left our solar system in 2012; its sister craft, Voyager 2, did so in 2018. The fantastic journey began in 1977, before the first episode of Cosmos aired. The mission was planned as a grand tour beyond the moon; beyond Mars, Jupiter, Saturn, Uranus and Neptune; and maybe even into interstellar space. The fact that it actually happened makes this humanity's greatest space mission. In *The Interstellar Age*, award-winning planetary scientist Jim Bell reveals what drove and continues to drive the members of this extraordinary team, including Ed Stone, Voyager's chief scientist and the one-time head of NASA's Jet Propulsion Lab; Charley Kohlhase, an orbital dynamics engineer who helped to design many of the critical slingshot maneuvers around planets that enabled the Voyagers to travel so far; and the geologist whose Earth-bound experience would prove of little help in interpreting the strange new landscapes revealed in the Voyagers' astoundingly clear images of moons and planets. Speeding through space at a mind-bending eleven miles a second, Voyager 1 and Voyager 2 are now beyond our solar system's planets, the first man-made objects to go interstellar. By the time Voyager passes its first star in about 40,000 years, the gold record on the spacecraft, containing various music and images including Chuck Berry's "Johnny B. Goode," will still be playable. *An ALA Notable Book of 2015*

Demand for Technical and Vocational Education and Training (TVET) in Malaysia has been growing extensively,

involving various involvement from industry and academia. Research related to the improvement of TVET in Malaysia, as well as the sustainability of TVET especially in the Industrial Revolution 4.0 era are among the topics of interest presented in this book. The input from this research provides better insight on the current situation of TVET in Malaysia as a whole, opening up various research fields to be explored in the future by other researchers. The development of education on an international level has sparked the idea for educators and academia to find solutions on issues of education relevant to the 21st century, hence this book shares the strategies and efforts needed to strengthen the education in various regions and make sure it is on par with education in developed countries.

Why do so many learners, even those who are successful, feel that they are outsiders in the world of mathematics? Taking the central importance of language in the development of mathematical understanding as its starting point, *Mathematical Literacy* explores students' experiences of doing mathematics from primary school to university - what they think mathematics is, how it is presented to them, and what they feel about it. Building on a range of theory which focuses on community, knowledge, and identity, the author examines two particular issues: the relationship between language, learning, and mathematical knowledge, and the relationship between identity, equity, and processes of exclusion/inclusion. In this comprehensive and accessible book, the author extends our understanding of the process of gaining mathematical fluency, and provides tools for an exploration of mathematics learning across different groups in different social contexts. *Mathematical Literacy's* analysis of how learners develop particular relationships with the subject, and what we might do to promote equity through the development of positive relationships, is of interest across all sectors of education—to researchers, teacher educators, and university educators.

This volume contains the peer-reviewed proceedings of the International Conference on Modelling and Simulation (MS-17), held in Kolkata, India, 4th-5th November 2017, organized by the Association for the Advancement of Modelling and Simulation Techniques in Enterprises (AMSE, France) in association with the Institution of Engineering Technology (IET, UK), Kolkata Network. The contributions contained here showcase some recent advances in modelling and simulation across various aspects of science and technology. This book brings together articles describing applications of modelling and simulation techniques in fields as diverse as physics, mathematics, electrical engineering, industrial electronics, control, automation, power systems, energy and robotics. It includes a special section on mechanical, fuzzy, optical and opto-electronic control of oscillations. It provides a snapshot of the state of the art in modelling and simulation methods and their applications, and will be of interest to researchers and engineering professionals from industry, academia and research organizations.

This book presents the proceedings of SympoSIMM 2020, the 3rd edition of the Symposium on Intelligent Manufacturing

and Mechatronics. Focusing on "Strengthening Innovations Towards Industry 4.0", the book presents studies on the details of Industry 4.0's current trends. Divided into five parts covering various areas of manufacturing engineering and mechatronics stream, namely, artificial intelligence, instrumentation and controls, intelligent manufacturing, modelling and simulation, and robotics, the book will be a valuable resource for readers wishing to embrace the new era of Industry 4.0. In recent years, it was realized that Radio Cognitive Systems seems to be a real need in the near future evolution, especially because of the severe spectrum regulations and channel congestion problems. Moreover high data rates become more and more necessary for normal professional needs or at home based users. Cognitive radio systems were first defined in the late of 1990s. The idea is to integrate a new concept of channel environmental sensing, followed by a knowledge based standard learning, which in return helps to identify free channel spectrum slots. These slots can be used by a third party user in a way to take advantage of the unused spectrum. This type of communication provides dynamic opportunistic algorithm for spectrum access. The new concept has to be adaptive and based on a reconfigurable hardware with a real time processing. Such cognitive radio systems can be also used in indoor wireless communications, where more and more wireless peripherals and tools are used in a limited space, and once again data packet congestion is a real problem. This book is written by specialists working in the field of telecommunication and signal processing. Various aspects of the radio cognitive systems are discussed with some applications and implementations such as software defined radios. The book is composed of seven chapters; as each chapter is written in a self-contained manner, the reader can use the book without any restrictive ordering of the chapters. At the end of the chapters there are valuable references that provide in depth coverage of the application...

This book includes a set of rigorously reviewed world-class manuscripts addressing and detailing state-of-the-art research projects in the areas of Computer Science, Computer Engineering and Information Sciences. The book presents selected papers from the conference proceedings of the International Conference on Systems, Computing Sciences and Software Engineering (SCSS 2006). All aspects of the conference were managed on-line.

This double volume set (LNAI 10863-10864) constitutes the refereed proceedings of the 25th International Workshop, EG-ICE 2018, held in Lausanne, Switzerland, in June 2018. The 58 papers presented in this volume were carefully reviewed and selected from 108 submissions. The papers are organized in topical sections on Advanced Computing in Engineering, Computer Supported Construction Management, Life-Cycle Design Support, Monitoring and Control Algorithms in Engineering, and BIM and Engineering Ontologies.

Modelling and Simulation in Science, Technology and Engineering Mathematics Proceedings of the International Conference on Modelling and Simulation (MS-17) Springer

This book engages in an ongoing topic, such as the implementation of nature-inspired metaheuristic algorithms, with a main concentration on optimization problems in different fields of engineering optimization applications. The chapters of the book provide concise overviews of various nature-inspired metaheuristic algorithms, defining their profits in obtaining the optimal solutions of tiresome engineering design problems that cannot be efficiently resolved via conventional mathematical-based techniques. Thus, the chapters report on advanced studies on the applications of not only the traditional, but also the contemporary certain nature-inspired metaheuristic algorithms to specific engineering optimization problems with single and multi-objectives. Harmony search, artificial bee colony, teaching learning-based optimization, electrostatic discharge, grasshopper, backtracking search, and interactive search are just some of the methods exhibited and consulted step by step in application contexts. The book is a perfect guide for graduate students, researchers, academicians, and professionals willing to use metaheuristic algorithms in engineering optimization applications.

This book explores several problems and their solutions regarding data analysis and prediction for industrial applications. Machine learning is a prominent topic in modern industries: its influence can be felt in many aspects of everyday life, as the world rapidly embraces big data and data analytics. Accordingly, there is a pressing need for novel and innovative algorithms to help us find effective solutions in industrial application areas such as media, healthcare, travel, finance, and retail. In all of these areas, data is the crucial parameter, and the main key to unlocking the value of industry. The book presents a range of intelligent algorithms that can be used to filter useful information in the above-mentioned application areas and efficiently solve particular problems. Its main objective is to raise awareness for this important field among students, researchers, and industrial practitioners.

Black phosphorus (BP)-based two-dimensional (2D) nanomaterials are used as components in practical industrial applications in biomedicine, electronics, and photonics. There is a need to controllably shape engineered scalable structures of 2D BP building blocks, and their assembly/organization is desired for the formation of three-dimensional (3D) forms such as macro and hybrid architectures, as it is expected that these architectures will deliver even better materials performance in applications.

Semiconducting Black Phosphorus: From 2D Nanomaterial to Emerging 3D Architecture provides an overview of the various synthetic strategies for 2D BP single-layer nanomaterials, their scalable synthesis, properties, and assemblies into 3D architecture. The book ? covers defect engineering and physical properties of black phosphorous; ? describes different strategies for the development of 2D nanostructures of BP with other species such as polymers, organic molecules, and other inorganic materials; ? offers a comparative study of 3D BP structures with other 3D architectures such as dichalcogenides (TMDs, graphene, and boron nitride); and ? discusses in detail applications of 3D macrostructures of BP in various fields such as energy, biomedical, and catalysis. This is an essential reference for researchers and advanced students in materials science and chemical, optoelectronic, and electrical engineering.

This book examines the current state of the field of mathematics pre-service teacher education through the theme of borders. Borders are ubiquitous; they can be used to define, classify, organize, make sense of, and/or group. There are many ways that the

concept of a border illuminates the field of mathematics pre-service teacher education. Consequently, there are a multitude of responses to these borders: researchers and practitioners question, challenge, cross, blur, and erase them. Chapters include the following topics: explorations of mathematics across topics (e.g., geometry, algebra, probability) and with other disciplines (e.g., science, the arts, social sciences); challenging gender, cultural, and racial borders; exploring the structure and curriculum of teacher education programs; spaces inhabited by teacher education programs (e.g., university, community); and international collaborations and programs to promote cross-cultural sharing and learning. The book targets a readership of researchers and graduate students in integrated education studies, teacher education, practitioners of mathematics education, curriculum developers, and educational administrators and policy makers. ?

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