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Engineering Electromagnetics Engineering Electromagnetics Vectors & Coordinate Systems for Electromagnetics Electromagnetic Fields & Waves Electromagnetic Field Theories for Engineering Electromagnetic Fields (Theory and Problems) Fundamentals of Electromagnetics with MATLAB Introduction to Subsurface Imaging Maxwell's Equations Elements of Electromagnetics Antenna Design for Mobile Devices Field Mathematics for Electromagnetics, Photonics, and Materials Science Thermodynamics Instrumentation Reference Book Introduction to Electromagnetic Waves with Maxwell's Equations Indoor Wireless Communications EMC for Product Designers Electromagnetic Waves, Materials, and Computation with MATLAB Electromagnetics and Antenna Technology Electromagnetics and Transmission Lines Practical Electromagnetics Electromagnetics for Engineering Students (Part 2) Engineering Electromagnetics 2-D Electromagnetic Simulation of Passive Microstrip Circuits Cable Shielding for Electromagnetic Compatibility Fundamentals of Engineering Electromagnetics Introduction to Engineering Electromagnetic Fields Handbook of Engineering Electromagnetics Microelectronics Failure Analysis Desk Reference, Seventh Edition Mechanics of Electromagnetic Materials and Structures Advanced Engineering Electromagnetics Electromagnetic Theory and Applications in Beam-Wave Electronics The Foundations of Signal Integrity Fundamentals of Applied Electromagnetics 4th Kuala Lumpur International Conference on Biomedical Engineering 2008 Microwave Engineering Electricity, Magnetism and Electromagnetic Theory The Publishers Weekly Fiber Optic Communications Elements of Electromagnetics

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Instrumentation is not a clearly defined subject, having a 'fuzzy' boundary with a number of other disciplines. Often categorized as either 'techniques' or 'applications' this book addresses the various applications that may be needed with reference to the practical techniques that are available for the instrumentation or measurement of a specific physical quantity or quality. This makes it of direct interest to anyone working in the process, control and instrumentation fields where these measurements are essential. * Comprehensive and authoritative collection of technical information * Written by a collection of specialist contributors * Updated to include chapters on the fieldbus standards, reliability, EMC, 'virtual instrumentation', fibre optics, smart and intelligent transmitters, analyzers, level and flow meters, and many more This book is designed to serve as a textbook for UG and PG students of Electronics and Communication, Electronics and Electrical, Electronics & Instrumentation and Telecommunication Engineering branches. It provides a thorough understanding of the electromagnetic theory and their properties, application and also the modern trends in Electromagnetism in detail. Book also describes transmission lines, wave guides, as well as the effects of EMI/EMC, including impedance matching and antennas. Written in an easy-to-understand manner, the book includes several illustrative examples, objective-type questions and exercise Questions to reinforce the theoretical understanding of subject. Appendices provide information and expressions as well as design data for references. "Now in its Seventh Edition, Bill Hayt and John Buck's Engineering Electromagnetics is a classic book that has been updated for electromagnetics today. - This widely respected book stresses fundamentals and problem solving, and discusses the material in an understandable, readable way. Numerous illustrations and analogies are provided to aid the reader in grasping difficult concepts. - In addition, independent learning is facilitated by the

presence of many examples and problems."--Jacket. The 4th Edition of Cengel & Boles Thermodynamics: An Engineering Approach takes thermodynamics education to the next level through its intuitive and innovative approach. A long-time favorite among students and instructors alike because of its highly engaging, student-oriented conversational writing style, this book is now the most widely adopted thermodynamics text in the U.S. and in the world. This book highlights the fundamental principles of optical fiber technology required for understanding modern high-capacity lightwave telecom networks. Such networks have become an indispensable part of society with applications ranging from simple web browsing to critical healthcare diagnosis and cloud computing. Since users expect these services to always be available, careful engineering is required in all technologies ranging from component development to network operations. To achieve this understanding, this book first presents a comprehensive treatment of various optical fiber structures and diverse photonic components used in optical fiber networks. Following this discussion are the fundamental design principles of digital and analog optical fiber transmission links. The concluding chapters present the architectures and performance characteristics of optical networks. The mathematical theory of wave propagation along a conductor with an external coaxial return is very old, going back to the work of Rayleigh, Heaviside, and J. J. Thomson. These words were written by S. A. Schelkunoff back in 1934. Indeed, those early works dealt with signal propagation along the line as well as electromagnetic shielding of the environment inside and/or outside the metallic enclosures. Maxwell himself developed pioneering studies of single-layer shielding shells, while a paper with such a "modern" title as "On the Magnetic Shielding of Concentric Spherical Shells" was presented by A. W. Rucker as early as 1893! * Such "state of the art" shielding theory created in the last century is even more amazing if you think that at almost the same time (namely, in the 1860s), a manuscript of Jules Verne's book, Paris in the 20th Century, was rejected by a publisher because it predicted such "outrageously incredible" electrotechnology as, for example, FAX service by wires and the electrocutioner's chair. (With regard to the last invention, I suspect many readers would rather Jules Verne has been wrong.) However, although the beginning of electromagnetic shielding theory and its implementation to electronic cables date back more than a century, this dynamic field keeps constantly growing, driven by practical applications. Widely regarded as the standard text on EMC, Tim Williams' book provides all the key information needed to meet the requirements of the latest EMC Directive. Most importantly, it shows how to incorporate EMC principles into the product design process, avoiding cost and performance penalties, meeting the needs of specific standards and resulting in a better overall product. As well as covering the very latest legal requirements, the fourth edition has been thoroughly updated in line with the latest best practice in EMC compliance and product design. Coverage has been considerably expanded to include the R & TTE and Automotive EMC Directives, as well as the military aerospace standards of DEF STAN 59-41 and DO160E. A new chapter on systems EMC is included, while short case studies demonstrate how EMC product design is put into practice. Tim Williams has worked for a variety of companies as an electronic design engineer over the last 25 years. He has monitored the progress of the EMC Directive and its associated standards since it was first made public. He now runs his own consultancy specialising in EMC design and test advice and training. * Includes the compliance procedures of the latest EMC Directive: 2004/108/EC * Short case studies demonstrating how EMC product design is put into practice. * Packed full with many new chapters including: - The R & TTE Directive and the Automotive EMC Directive looking at compliance aspects of radio and telecom terminal equipment and automotive electronic products - New chapter on military aerospace standards of DEF STAN 59-41 and DO160E

- New chapter on systems EMC. Engineering Electromagnetics presents a bold approach to the teaching of electromagnetics to the electrical engineering undergraduate. This book begins by adopting Maxwell's Equations as the fundamental laws, an approach contrary to the traditional presentation of physical laws in the chronological order of their discovery that starts with Coulomb's Law. The use of Maxwell's Equations provides broad physical laws of general applicability and prevents confusion among students as to when specific laws may be applied. A problem solving or engineering analysis approach is used extensively throughout this text. Real life problems are presented and then reduced to an appropriate model or facsimile for solution. This publication is intended for engineering students at junior or senior level. The Electronic Device Failure Analysis Society proudly announces the Seventh Edition of the Microelectronics Failure Analysis Desk Reference, published by ASM International. The new edition will help engineers improve their ability to verify, isolate, uncover, and identify the root cause of failures. Prepared by a team of experts, this updated reference offers the latest information on advanced failure analysis tools and techniques, illustrated with numerous real-life examples. This book is geared to practicing engineers and for studies in the major area of power plant engineering. For non-metallurgists, a chapter has been devoted to the basics of material science, metallurgy of steels, heat treatment, and structure-property correlation. A chapter on materials for boiler tubes covers composition and application of different grades of steels and high temperature alloys currently in use as boiler tubes and future materials to be used in supercritical, ultra-supercritical and advanced ultra-supercritical thermal power plants. A comprehensive discussion on different mechanisms of boiler tube failure is the heart of the book. Additional chapters detailing the role of advanced material characterization techniques in failure investigation and the role of water chemistry in tube failures are key contributions to the book. An authoritative view of Maxwell's Equations that takes theory to practice Maxwell's Equations is a practical guide to one of the most remarkable sets of equations ever devised. Professor Paul Huray presents techniques that show the reader how to obtain analytic solutions for Maxwell's equations for ideal materials and boundary conditions. These solutions are then used as a benchmark for solving real-world problems. Coverage includes: An historical overview of electromagnetic concepts before Maxwell and how we define fundamental units and universal constants today A review of vector analysis and vector operations of scalar, vector, and tensor products Electrostatic fields and the interaction of those fields with dielectric materials and good conductors A method for solving electrostatic problems through the use of Poisson's and Laplace's equations and Green's function Electrical resistance and power dissipation; superconductivity from an experimental perspective; and the equation of continuity An introduction to magnetism from the experimental inverse square of the Biot-Savart law so that Maxwell's magnetic flux equations can be deduced Maxwell's Equations serves as an ideal textbook for undergraduate students in junior/senior electromagnetics courses and graduate students, as well as a resource for electrical engineers. This book is aimed to provide the basic preparatory material to the students who wish to study the electromagnetism as part of their course study. In the discussion of different concepts of electromagnetism, use of vectors and coordinates systems are unavoidable. Most of the books avoid details of these topics due to scope of the book or the syllabus. Most of the students take it for granted the formulae stated in the book. Some students when try to understand the three dimensional aspects of the coordinate systems they find some confusion. To help student clear their concepts on these aspects and to answer how different readily given expressions are derived we have come forward to write this book. The book starts discussion from very basic definitions of vector terminology and then relates this with

the coordinate systems. Most needed coordinate systems are Cartesian, cylindrical and spherical coordinate systems. These systems are discussed from the basic level and culminate into the derivations of the longer expressions. As problems are already available in the books of similar nature authors have not included them in this book. It is hoped that this book would clear most of the concepts needed to study the electromagnetism. Detailing the active and passive aspects of microwaves, **Microwave Engineering: Concepts and Fundamentals** covers everything from wave propagation to reflection and refraction, guided waves, and transmission lines, providing a comprehensive understanding of the underlying principles at the core of microwave engineering. This encyclopedic text not only This is a textbook designed to provide analytical background material in the area of Engineering Electromagnetic Fields for the senior level undergraduate and preparatory level graduate electrical engineering students. It is also an excellent reference book for researchers in the field of computational electromagnetic fields. The textbook covers ? Static Electric and Magnetic Fields: The basic laws governing the Electrostatics, Magnetostatics with engineering examples are presented which are enough to understand the fields and the electric current and charge sources. Dynamic Electromagnetic Fields: The Maxwell's equations in Time-Domain and solutions, the Maxwell's equations in Frequency-Domain and solutions. Extensive approaches are presented to solve partial differential equations satisfying electromagnetic boundary value problems. Foundation to electromagnetic field radiation, guided wave propagation is discussed to expose at the undergraduate level application of the Maxwell's equations to practical engineering problems. The first book to focus on the electromagnetic basis of signal integrity **The Foundations of Signal Integrity** is the first of its kind—a reference that examines the physical foundation of system integrity based on electromagnetic theory derived from Maxwell's Equations. Drawing upon the cutting-edge research of Professor Paul Huray's team of industrial engineers and graduate students, it develops the physical theory of wave propagation using methods of solid state and high-energy physics, mathematics, chemistry, and electrical engineering before addressing its application to modern high-speed systems. Coverage includes: All the necessary electromagnetic theory needed for a complete understanding of signal integrity Techniques for obtaining analytic solutions to Maxwell's Equations for ideal materials and boundary conditions Plane electromagnetic waves Plane waves in compound media Transmission lines and waveguides Ideal models vs. real-world systems Complex permittivity of propagating media Surface roughness Advanced signal integrity Signal integrity simulations Problem sets for each chapter With its thorough coverage of this relatively new discipline, the book serves as an ideal textbook for senior undergraduate and junior graduate students, as well as a resource for practicing engineers in this burgeoning field. At the end of each section, it typically stimulates the reader with open-ended questions that might lead to future theses or dissertation research. It is with great pleasure that we present to you a collection of over 200 high quality technical papers from more than 10 countries that were presented at the Biomed 2008. The papers cover almost every aspect of Biomedical Engineering, from artificial intelligence to biomechanics, from medical informatics to tissue engineering. They also come from almost all parts of the globe, from America to Europe, from the Middle East to the Asia-Pacific. This set of papers presents to you the current research work being carried out in various disciplines of Biomedical Engineering, including new and innovative researches in emerging areas. As the organizers of Biomed 2008, we are very proud to be able to come-up with this publication. We owe the success to many individuals who worked very hard to achieve this: members of the Technical Committee, the Editors, and the International Advisory Committee. We would like to take this opportunity to record our

thanks and appreciation to each and every one of them. We are pretty sure that you will find many of the papers illuminating and useful for your own research and study. We hope that you will enjoy yourselves going through them as much as we had enjoyed compiling them into the proceedings.

Assoc. Prof. Dr. Noor Azuan Abu Osman
Chairperson, Organising Committee, Biomed 2008

This volume contains papers presented at the Symposium on the Mechanics of Electromagnetic Materials and Structures of the 1999 ASME Summer Meeting in Blacksburg, Virginia, USA. Topics covered include continuum modelling of deformable electromagnetic materials, magnetoelasticity and electroelasticity. Experimental, computational, and theoretical results are presented. The Symposium and the book are enriched by the participation of contributors from industries and presentations related to device applications. Engineers do not have the time to wade through rigorously theoretical books when trying to solve a problem. Beginners lack the expertise required to understand highly specialized treatments of individual topics. This is especially problematic for a field as broad as electromagnetics, which propagates into many diverse engineering fields.

The time has expanded and updated, this practical guide is a one-stop design reference containing all an engineer needs when designing antennas. Integrates state-of-the-art technologies with a special section for step-by-step antenna design. Features up-to-date bio-safety and electromagnetic compatibility regulation compliance and latest standards. Newly updated with MIMO antenna design, measurements and requirements. Accessible to readers of many levels, from introductory to specialist. Written by a practicing expert who has hired and trained numerous engineers. Taking a vector-first approach, this text provides a balanced presentation of a host of topics including electrostatics, magnetostatics, fields, waves, and applications like transmission lines, waveguides, and antennas. The new edition includes new Application Notes detailing real-world connections, a revised math pre-test for professors to assess students' mathematical skills, and new and updated problems.

Global Demand for Streamlined Design and Computation
The explosion of wireless communications has generated a tidal wave of interest and development in computational techniques for electromagnetic simulation as well as the design and analysis of RF and microwave circuits. Learn About Emerging Disciplines, State-of-the-Art Methods

2-D Electromagnetic Simulation of Passive Microstrip Circuits describes this simple procedure in order to provide basic knowledge and practical insight into quotidian problems of microstrip passive circuits applied to microwave systems and digital technologies. The text dissects the latest emerging disciplines and methods of microwave circuit analysis, carefully balancing theory and state-of-the-art experimental concepts to elucidate the process of analyzing high-speed circuits. The author covers the newer techniques - such as the study of signal integrity within circuits, and the use of field map interpretations - employed in powerful electromagnetic simulation analysis methods. But why and how does the intrinsic two-dimensional simulation model used here reduce numerical error?

Step-by-Step Simulation Provides Insight and Understanding
The author presents the FDTD electromagnetic simulation method, used to reproduce different microstrip test circuits, as well as an explanation of the complementary electrostatic method of moments (MoM). Each reproduces different microstrip test circuits that are physically constructed and then studied, using a natural methodological progression to facilitate understanding. This approach gives readers a solid comprehension and insight into the theory and practical applications of the microstrip scenario, with emphasis on high-speed interconnection elements.

Balanis' second edition of Advanced Engineering Electromagnetics - a global best-seller for over 20 years - covers the advanced knowledge engineers involved in electromagnetic need to know, particularly as the topic relates to the fast-moving, continually evolving, and

rapidly expanding field of wireless communications. The immense interest in wireless communications and the expected increase in wireless communications systems projects (antenna, microwave and wireless communication) points to an increase in the number of engineers needed to specialize in this field. In addition, the Instructor Book Companion Site contains a rich collection of multimedia resources for use with this text. Resources include: Ready-made lecture notes in Power Point format for all the chapters. Forty-nine MATLAB® programs to compute, plot and animate some of the wave phenomena Nearly 600 end-of-chapter problems, that's an average of 40 problems per chapter (200 new problems; 50% more than in the first edition) A thoroughly updated Solutions Manual 2500 slides for Instructors are included. Electromagnetics for Engineering Students is a textbook in two parts, Part I and II, that cover all topics of electromagnetics needed for undergraduate students from vector analysis to antenna principles. In both parts of the book, the topics are presented in sufficient details such that the students will follow the analytical development easily. Each chapter is supported by many illustrative examples, solved problems, and the end of chapter problems to explain the principles of the topics and enhance the knowledge of the student. There are a total of 681 problems in the both parts of the book as follows: 162 illustrative examples, 88 solved problems, and 431 end of chapter problems. This part is a continuation of Part I and focuses on the application of Maxwell's equations and the concepts that are covered in Part I to analyze the characteristics of wave propagation in half-space and bounded media including metamaterials. Moreover, a chapter has been devoted to the topic of antennas to provide readers with the fundamental concepts related to antenna engineering. The key features of this part:

- In addition to the coverage of classical topics in electromagnetic normally covered in the similar available texts, this part of the book adds some advanced concepts and topics such as:
- Application of multi-pole expansion for vector potentials.
- More detailed analysis on the topic of waveguides including circular waveguides.
- Refraction through metamaterials and the concept of negative refractive index.
- Detailed and easy-to follow presentation of mathematical analyses and problems.
- An appendix of mathematical formulae and functions. Learn to solve both simple and complex electromagnetic problems with this text's unique integration of theoretical and mathematical concepts. With the author's guidance, you'll discover a broad range of classic and cutting-edge applications across a wide array of fields, including biomedicine, wireless communication, process control, and instrumentation. Case studies, detailed derivations, and 170 fully solved examples deepen your understanding of theory, and help you apply numerical methods to real-world problems. Readily available commercial software enables engineers and students to perform routine calculations and design without necessarily having a sufficient conceptual understanding of the anticipated solution. The software is so user-friendly that it usually produces a beautiful colored visualization of that solution, often camouflaging the fact that t Electromagnetics is too important in too many fields for knowledge to be gathered on the fly. A deep understanding gained through structured presentation of concepts and practical problem solving is the best way to approach this important subject. Fundamentals of Engineering Electromagnetics provides such an understanding, distilling the most important theoretical aspects and applying this knowledge to the formulation and solution of real engineering problems. Comprising chapters drawn from the critically acclaimed Handbook of Engineering Electromagnetics, this book supplies a focused treatment that is ideal for specialists in areas such as medicine, communications, and remote sensing who have a need to understand and apply electromagnetic principles, but who are unfamiliar with the field. Here is what the critics have to say about the original work "...accompanied with practical engineering applications and useful illustrations, as well

as a good selection of references ... those chapters that are devoted to areas that I am less familiar with, but currently have a need to address, have certainly been valuable to me. This book will therefore provide a useful resource for many engineers working in applied electromagnetics, particularly those in the early stages of their careers."

-Alastair R. Ruddle, The IEE Online "...a tour of practical electromagnetics written by industry experts ... provides an excellent tour of the practical side of electromagnetics ... a useful reference for a wide range of electromagnetics problems ... a very useful and well-written compendium..." -Alfy Riddle, IEEE Microwave Magazine

Fundamentals of Engineering Electromagnetics lays the theoretical foundation for solving new and complex engineering problems involving electromagnetics. A four year Electrical and Electronic engineering curriculum normally contains two modules of electromagnetic field theories during the first two years. However, some curricula do not have enough slots to accommodate the two modules. This book, **Electromagnetic Field Theories**, is designed for Electrical and Electronic engineering undergraduate students to provide fundamental knowledge of electromagnetic fields and waves in a structured manner. A comprehensive fundamental knowledge of electric and magnetic fields is required to understand the working principles of generators, motors and transformers. This knowledge is also necessary to analyze transmission lines, substations, insulator flashover mechanism, transient phenomena, etc. Recently, academics and researches are working for sending electrical power to a remote area by designing a suitable antenna. In this case, the knowledge of electromagnetic fields is considered as important tool. Discover an innovative and fresh approach to teaching classical electromagnetics at a foundational level **Introduction to Electromagnetic Waves with Maxwell's Equations** delivers an accessible and practical approach to teaching the wellknown topics all electromagnetics instructors must include in their syllabus. Based on the author's decades of experience teaching the subject, the book is carefully tuned to be relevant to an audience of engineering students who have already been exposed to the basic curricula of linear algebra and multivariate calculus. Forming the backbone of the book, Maxwell's equations are developed step-by-step in consecutive chapters, while related electromagnetic phenomena are discussed simultaneously. The author presents accompanying mathematical tools alongside the material provided in the book to assist students with retention and comprehension. The book contains over 100 solved problems and examples with stepwise solutions offered alongside them. An accompanying website provides readers with additional problems and solutions. Readers will also benefit from the inclusion of: A thorough introduction to preliminary concepts in the field, including scalar and vector fields, cartesian coordinate systems, basic vector operations, orthogonal coordinate systems, and electrostatics, magnetostatics, and electromagnetics An exploration of Gauss' Law, including integral forms, differential forms, and boundary conditions A discussion of Ampere's Law, including integral and differential forms and Stoke's Theorem An examination of Faraday's Law, including integral and differential forms and the Lorentz Force Law Perfect for third-and fourth-year undergraduate students in electrical engineering, mechanical engineering, applied maths, physics, and computer science, **Introduction to Electromagnetic Waves with Maxwell's Equations** will also earn a place in the libraries of graduate and postgraduate students in any STEM program with applications in electromagnetics. **Indoor Wireless Communications: From Theory to Implementation** provides an in-depth reference for design engineers, system planners and post graduate students interested in the vastly popular field of indoor wireless communications. It contains wireless applications and services for in-building scenarios and knowledge of key elements in the design and implementation of these systems. Technologies such as Wireless Local Area Networks, Bluetooth, ZigBee, Indoor

Optical Communications, WiMAX, UMTS and GSM for indoor environments are fully explained and illustrated with examples. Antennas and propagation issues for in-building scenarios are also discussed, emphasizing models and antenna types specifically developed for indoor communications. An exhaustive survey on indoor wireless communication equipment is also presented, covering all available technologies including antennas, distribution systems, transceivers and base stations. Electromagnetic Fields Electricity, Magnetism and Electromagnetic Theory has been designed to meet the needs of BSc (Physics) students as per the UGC Choice Based Credit System. This textbook provides a thorough understanding of the fundamental concepts of electricity, magnetism and electromagnetic theory. Having a problem-solving approach, it covers the entire spectrum of the subject with discussion on topics such as electrostatics, magnetostatics, electromagnetic induction, Maxwell's equations and electromagnetic wave propagation. The concepts are exhaustively presented with numerous examples and figures/diagrams which would help the students in analysing and retaining the concepts in an effective manner. Written by a leading expert in the field, this practical new resource presents the fundamentals of electromagnetics and antenna technology. This book covers the design, electromagnetic simulation, fabrication, and measurements for various types of antennas, including impedance matching techniques and beamforming for ultrawideband dipoles, monopoles, loops, vector sensors for direction finding, HF curtain arrays, 3D printed nonplanar patch antenna arrays, waveguides for portable radar, reflector antennas, and other antennas. It explores the essentials of phased array antennas and includes detailed derivations of important field equations, and a detailed formulation of the method of moments. This resource exhibits essential derivations of equations, providing readers with a strong foundation of the underpinnings of electromagnetics and antennas. It includes a complete chapter on the details of antenna and electromagnetic test and measurement. This book explores details on 3D printed non-planar circular patch array antenna technology and the design and analysis of a planar array-fed axisymmetric gregorian reflector. The lumped-element impedance matched antennas are examined and include a look at an analytic impedance matching solution with a parallel LC network. This book provides key insight into many aspects of antenna technology that have broad applications in radar and communications. Describing and evaluating the basic principles and methods of subsurface sensing and imaging, Introduction to Subsurface Imaging is a clear and comprehensive treatment that links theory to a wide range of real-world applications in medicine, biology, security and geophysical/environmental exploration. It integrates the different sensing techniques (acoustic, electric, electromagnetic, optical, x-ray or particle beams) by unifying the underlying physical and mathematical similarities, and computational and algorithmic methods. Time-domain, spectral and multisensor methods are also covered, whilst all the necessary mathematical, statistical and linear systems tools are given in useful appendices to make the book self-contained. Featuring a logical blend of theory and applications, a wealth of color illustrations, homework problems and numerous case studies, this is suitable for use as both a course text and as a professional reference. CD-ROM contains: Demonstration exercises -- Complete solutions -- Problem statements. This second edition comes from your suggestions for a more lively format, self-learning aids for students, and the need for applications and projects without being distracted from EM Principles. Flexibility Choose the order, depth, and method of reinforcing EM Principles—the PDF files on CD provide Optional Topics, Applications, and Projects. Affordability Not only is this text priced below competing texts, but also the topics on CD (and downloadable to registered users) provide material sufficient for a second term of study with no additional book for students to buy. MATLAB

This book takes full advantage of MATLAB's power to motivate and reinforce EM Principles. No other EM book is better integrated with MATLAB. The second edition is even richer and easier to incorporate into course use with the new, self-paced MATLAB tutorials on the CD and available to registered users. The primary objective of this book is to offer a review of vector calculus needed for the physical sciences and engineering. This review includes necessary excursions into tensor analysis intended as the reader's first exposure to tensors, making aspects of tensors understandable at the undergraduate level. Electromagnetics and Transmission Lines Textbook resource covering static electric and magnetic fields, dynamic electromagnetic fields, transmission lines, antennas, and signal integrity within a single course. Electromagnetics and Transmission Lines provides coverage of what every electrical engineer (not just the electromagnetic specialist) should know about electromagnetic fields and transmission lines. This work examines several fundamental electrical engineering concepts and components from an electromagnetic fields viewpoint, such as electric circuit laws, resistance, capacitance, and self and mutual inductances. The approach to transmission lines (T-lines), Smith charts, and scattering parameters establishes the underlying concepts of vector network analyzer (VNA) measurements. System-level antenna parameters, basic wireless links, and signal integrity are examined in the final chapters. As an efficient learning resource, electromagnetics and transmission lines content is strategically modulated in breadth and depth towards a single semester objective. Extraneous, distracting topics are excluded. The wording style is somewhat more conversational than most electromagnetics textbooks in order to enhance student engagement and inclusivity while conveying the rigor that is essential for engineering student development. To aid in information retention, the authors also provide supplementary material, including a homework solutions manual, lecture notes, and VNA experiments. Sample topics covered in Electromagnetics and Transmission Lines include: Vector algebra and coordinate systems, Coulomb's law, Biot-Savart law, Gauss's law, and solenoidal magnetic flux. Electric potential, Ampere's circuital law, Faraday's law, displacement current, and the electromagnetic principles underlying resistance, capacitance, and self and mutual inductances. The integral form of Maxwell's equations from a conceptual viewpoint that relates the equations to physical understanding (the differential forms are also included in an appendix). DC transients and AC steady-state waves, reflections, and standing waves on T-lines. Interrelationships of AC steady-state T-line theory, the Smith chart, and scattering parameters. Antenna basics and line-of-sight link analysis using the Friis equation. An introduction to signal integrity. Electromagnetics and Transmission Lines is an authoritative textbook learning resource, suited perfectly for engineering programs at colleges and universities with a single required electromagnetic fields course. Student background assumptions are multivariable calculus, DC and AC electric circuits, physics of electromagnetics, and elementary differential equations.