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Mathematics of Computing --  
General.

Fundamentals of Applied  
Electromagnetics Prentice  
Hall

With the rapid growth of  
wireless technologies, more  
and more people are trying  
to gain a better  
understanding of  
electromagnetics. After all,  
electromagnetic fields have  
a direct impact on reception

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in all wireless applications. This text explores electromagnetics, presenting practical applications for wireless systems, transmission lines, waveguides, antennas, electromagnetic interference, and microwave engineering. It is designed for use in a one- or two-semester electromagnetics sequence for electrical engineering students at the junior and senior level. The first book on the subject to tackle the impact of electromagnetics on wireless applications: Includes

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numerous worked-out example problems that provide you with hands-on experience in solving electromagnetic problems. Describes a number of practical applications that show how electromagnetic theory is put into practice. Offers a concise summary at the end of each chapter that reinforces the key points. Detailed MATLAB examples are integrated throughout the book to enhance the material. Modern technology is rapidly developing and for this reason future engineers

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need to acquire advanced knowledge in science and technology, including electromagnetic phenomena. This book is a contemporary text of a one-semester course for junior electrical engineering students. It covers a broad spectrum of electromagnetic phenomena such as, surface waves, plasmas, photonic crystals, negative refraction as well as related materials including superconductors. In addition, the text brings together electromagnetism and optics as the majority of texts discuss electromagnetism

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disconnected from optics. In contrast, in this book both are discussed. Seven labs have been developed to accompany the material of the book.

Electromagnetics  
With Problems and Solutions  
Introduction to Engineering  
Electromagnetics  
Fundamentals of  
Electromagnetics with  
Engineering Applications  
A Modern Approach to  
Classical Theorems of  
Advanced Calculus  
***This is a textbook on  
electromagnetic fields  
and waves completely***

***based on conceptual understanding of electromagnetics. The text provides operational knowledge and firm grasp of electromagnetic fundamentals aimed toward practical engineering applications by combining fundamental theory and a unique and comprehensive collection of as many as 888 conceptual questions and problems in electromagnetics. Conceptual questions are designed to strongly***

***enforce and enhance both the theoretical concepts and understanding and problem-solving techniques and skills in electromagnetics.***

***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-**



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**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.**

**Applied Electromagnetics  
and Electromagnetic**

**Compatibility deals with Radio Frequency Interference (RFI), which is the reception of undesired radio signals originating from digital electronics and electronic equipment. With today's rapid development of radio communication, these undesired signals as well as signals due to natural phenomena such as lightning, sparking, and others are becoming increasingly important in the general area of Electro Magnetic**

**Compatibility (EMC). EMC can be defined as the capability of some electronic equipment or system to be operated at desired levels of performance in a given electromagnetic environment without generating EM emissions unacceptable to other systems operating in the vicinity.**

**The clear, easy-to-understand introduction to digital communications  
Completely updated coverage of today's most**

**critical technologies**  
**Step-by-step**  
**implementation coverage**  
**Trellis-coded**  
**modulation, fading**  
**channels, Reed-Solomon**  
**codes, encryption, and**  
**more Exclusive coverage**  
**of maximizing**  
**performance with**  
**advanced "turbo codes"**  
**"This is a remarkably**  
**comprehensive treatment**  
**of the field, covering**  
**in considerable detail**  
**modulation, coding (both**  
**source and channel),**  
**encryption, multiple**  
**access and spread**

**spectrum. It can serve both as an excellent introduction for the graduate student with some background in probability theory or as a valuable reference for the practicing communication system engineer. For both communities, the treatment is clear and well presented." - Andrew Viterbi, The Viterbi Group Master every key digital communications technology, concept, and technique. Digital**

***Communications, Second Edition is a thoroughly revised and updated edition of the field's classic, best-selling introduction. With remarkable clarity, Dr. Bernard Sklar introduces every digital communication technology at the heart of today's wireless and Internet revolutions, providing a unified structure and context for understanding them -- all without sacrificing mathematical precision. Sklar begins by***

**introducing the  
fundamentals of signals,  
spectra, formatting, and  
baseband transmission.  
Next, he presents  
practical coverage of  
virtually every  
contemporary modulation,  
coding, and signal  
processing technique,  
with numeric examples  
and step-by-step  
implementation guidance.  
Coverage includes:  
Signals and processing  
steps: from information  
source through  
transmitter, channel,  
receiver, and**

**information sink Key  
tradeoffs: signal-to-  
noise ratios,  
probability of error,  
and bandwidth  
expenditure Trellis-  
coded modulation and  
Reed-Solomon codes:  
what's behind the math  
Synchronization and  
spread spectrum  
solutions Fading  
channels: causes,  
effects, and techniques  
for withstanding fading  
The first complete how-  
to guide to turbo codes:  
squeezing maximum  
performance out of**



***digital connections***

***Implementing encryption  
with PGP, the de facto  
industry standard***

***Whether you're building  
wireless systems, xDSL,  
fiber or coax-based  
services, satellite***

***networks, or Internet  
infrastructure, Sklar  
presents the theory and  
the practical***

***implementation details  
you need. With nearly  
500 illustrations and  
300 problems and  
exercises, there's never  
been a faster way to  
master advanced digital***

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**communications. CD-ROM  
INCLUDED The CD-ROM  
contains a complete  
educational version of  
Elanix' SystemView DSP  
design software, as well  
as detailed notes for  
getting started, a  
comprehensive DSP  
tutorial, and over 50  
additional  
communications  
exercises.**

**Electromagnetic Field  
Theory Fundamentals  
Solutions Manual  
Electromagnetics for  
Engineers  
Field and Wave**

***Electromagnetics  
Conceptual  
Electromagnetics***

**For courses in Electromagnetics offered in Electrical Engineering departments and Applied Physics. Designed specifically for a one-semester EM course covering both statics and dynamics, the book uses a number of tools to facilitate understanding of EM concepts and to demonstrate their relevance to modern technology. Technology Briefs provide overviews of both fundamental and sophisticated technologies, including the basic operation of an electromagnet in magnetic recording, the invention of the**

**laser, and how EM laws underlie the operation of many types of sensors, bar code readers, GPS, communication satellites, and X-Ray tomography, among others. A CD-ROM packed with video presentations and solved problems accompanies the text**

**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.

**Partial Differential Equations** presents a balanced and comprehensive introduction to the concepts and techniques required to solve problems containing unknown functions of multiple variables. While focusing on the three most classical partial differential equations

**(PDEs)—the wave, heat, and Laplace equations—this detailed text also presents a broad practical perspective that merges mathematical concepts with real-world application in diverse areas including molecular structure, photon and electron interactions, radiation of electromagnetic waves, vibrations of a solid, and many more. Rigorous pedagogical tools aid in student comprehension; advanced topics are introduced frequently, with minimal technical jargon, and a wealth of exercises reinforce vital skills and invite additional self-study. Topics are presented in a logical progression, with major**



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**concepts such as wave propagation, heat and diffusion, electrostatics, and quantum mechanics placed in contexts familiar to students of various fields in science and engineering. By understanding the properties and applications of PDEs, students will be equipped to better analyze and interpret central processes of the natural world. For courses in electromagnetics. Bridging the gap between circuits and electromagnetics Widely in the field, this authoritative text bridges the gap between circuits and electromagnetics material. Fundamentals of Applied Electromagnetics begins coverage**

**with transmission lines, leading students from familiar concepts into more advanced topics and applications. The 8th Edition builds on the core content and style of previous editions, retaining the student-friendly approach and hands-on simulation modules that help students develop a deeper understanding of electromagnetic concepts and applications. Enhanced graphs and illustrations and an expanded scope of topics in the Technology Briefs, establish additional bridges between electromagnetic fundamentals and their countless engineering and**

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scientific applications.

**Computational Methods in  
Geophysical Electromagnetics**

**Early Transmission Lines**

**Approach**

**Digital Design: International  
Version**

**Introduction to Electrodynamics**

**Fundamental Mechanics of  
Fluids, Third Edition**

***Guru and Hiziroglu have  
produced an accessible and  
user-friendly text on  
electromagnetics that will  
appeal to both students and  
professors teaching this  
course. This lively book  
includes many worked  
examples and problems in***

**every chapter, as well as chapter summaries and background revision material where appropriate. The book introduces undergraduate students to the basic concepts of electrostatic and magnetostatic fields, before moving on to cover Maxwell's equations, propagation, transmission and radiation. Chapters on the Finite Element and Finite Difference method, and a detailed appendix on the Smith chart are additional enhancements. MathCad code for many**

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**examples in the book and a comprehensive solutions set are available at [www.cambridge.org/9780521830164](http://www.cambridge.org/9780521830164).**

**An accessible, yet mathematically rigorous, one-semester textbook, engaging students through use of problems, examples, and applications.**

**"Fundamental of Engineering Electromagnetics" not only presents the fundamentals of electromagnetism in a concise and logical manner, but also includes a variety of interesting and important applications. While adapted**

***from his popular and more extensive work, "Field and Wave Electromagnetics," this text incorporates a number of innovative pedagogical features. Each chapter begins with an overview, which serves to offer qualitative guidance to the subject matter and motivate the student. Review questions and worked examples throughout each chapter reinforce the student's understanding of the material. Remarks boxes following the review questions and margin notes***

**throughout the book serve as additional pedagogical aids. Back Cover Fundamentals of Engineering Electromagnetics is a shorter version of Dr. Cheng's best-selling Field and Wave Electromagnetics, Second Edition. Fundamentals has been written in summaries. Emphasizes examples and exercises that invite students to build their knowledge of electromagnetics by solving problems. Besides presenting electromagnetics**

***in a concise and logical manner, the text covers application topics such as electric motors, transmission lines, waveguides, antennas, antenna arrays, and radar systems.***

***This text provides students with the missing link that can help them master the basic principles of electromagnetics. The concept of vector fields is introduced by starting with clear definitions of position, distance, and base vectors. The symmetries of typical configurations are discussed***



***in detail, including cylindrical, spherical, translational, and two-fold rotational symmetries. To avoid serious confusion between symbols with two indices, the text adopts a new notation: a letter with subscript 1-2 for the work done in moving a unit charge from point 2 to point 1, in which the subscript 1-2 mimics the difference in potentials, while the hyphen implies a sense of backward direction, from 2 to 1. This text includes 300 figures in which real data are drawn to scale. Many figures provide***

***a three-dimensional view. Each subsection includes a number of examples that are solved by examining rigorous approaches in steps. Each subsection ends with straightforward exercises and answers through which students can check if they correctly understood the concepts. A total 350 examples and exercises are provided. At the end of each section, review questions are inserted to point out key concepts and relations discussed in the section. They are given with hints***

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**referring to the related  
equations and figures. The  
book contains a total of 280  
end-of-chapter problems.  
Electromagnetics, Volume 1  
(BETA)**

**Electric Machinery  
Fundamentals  
Advanced Engineering  
Electromagnetics  
Fundamentals of  
Electromagnetics for  
Electrical and Computer  
Engineering  
Fundamentals of  
Electromagnetics with  
MATLAB**

STUDENT COMPANION SITE Every  
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Applied Electromagnetics comes with a registration code which allows access to the Student's Book Companion Site. On the BCS the student will find: \* Detailed Solutions to Odd-Numbered Problems in the text \* Detailed Solutions to all Drill Problems from the text \* MATLAB code for all the MATLAB examples in the text \* Additional MATLAB demonstrations with code. This includes a Transmission Lines simulator created by the author. \* Weblinks to a vast array of resources for the engineering student. Go to [www.wiley.com/college/wentworth](http://www.wiley.com/college/wentworth) to link to Applied Electromagnetics and the Student Companion Site. ABOUT THE PHOTO Passive RFID systems, consisting of readers and tags, are expected to replace bar codes as the primary means of identification,

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inventory and billing of everyday items. The tags typically consist of an RFID chip placed on a flexible film containing a planar antenna. The antenna captures radiation from the reader's signal to power the tag electronics, which then responds to the reader's query. The PENI Tag (Product Emitting Numbering Identification Tag) shown, developed by the University of Pittsburgh in a team led by Professor Marlin H. Mickle, integrates the antenna with the rest of the tag electronics. RFID systems involve many electromagnetics concepts, including antennas, radiation, transmission lines, and microwave circuit components. (Photo courtesy of Marlin H. Mickle.)

Fundamentals of Applied  
Electromagnetics: Incl CDRom.

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An engaging writing style and a strong focus on the physics make this graduate-level textbook a must-have for electromagnetism students.

This book uses elementary versions of modern methods found in sophisticated mathematics to discuss portions of "advanced calculus" in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level.

Applied Electromagnetics and  
Electromagnetic Compatibility  
Partial Differential Equations  
Fundamentals of Engineering  
Electromagnetics

Digital Communications  
Fundamentals of Engineering  
Electromagnetics: Pearson New  
International Edition

Fundamental of Engineering  
Electromagnetics not only presents the

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fundamentals of electromagnetism in a concise and logical manner, but also includes a variety of interesting and important applications. While adapted from his popular and more extensive work, *Field and Wave Electromagnetics*, this text incorporates a number of innovative pedagogical features. Each chapter begins with an overview which serves to offer qualitative guidance to the subject matter and motivate the student. Review questions and worked examples throughout each chapter reinforce the student's understanding of the material. Remarks boxes following the review questions and margin notes throughout the book serve as additional pedagogical aids.

This book provides students with a thorough theoretical understanding of electromagnetic field equations and it also treats a large number of applications. The text is a comprehensive two-semester

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textbook. The work treats most topics in two steps – a short, introductory chapter followed by a second chapter with in-depth extensive treatment; between 10 to 30 applications per topic; examples and exercises throughout the book; experiments, problems and summaries. The new edition includes: modifications to about 30-40% of the end of chapter problems; a new introduction to electromagnetics based on behavior of charges; a new section on units; MATLAB tools for solution of problems and demonstration of subjects; most chapters include a summary. The book is an undergraduate textbook at the Junior level, intended for required classes in electromagnetics. It is written in simple terms with all details of derivations included and all steps in solutions listed. It requires little beyond basic calculus and can be used for self-study. The wealth of



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examples and alternative explanations makes it very approachable by students. More than 400 examples and exercises, exercising every topic in the book Includes 600 end-of-chapter problems, many of them applications or simplified applications Discusses the finite element, finite difference and method of moments in a dedicated chapter

One of the most methodical treatments of electromagnetic wave propagation, radiation, and scattering—including new applications and ideas Presented in two parts, this book takes an analytical approach on the subject and emphasizes new ideas and applications used today. Part one covers fundamentals of electromagnetic wave propagation, radiation, and scattering. It provides ample end-of-chapter problems and offers a 90-page solution manual to help readers check and comprehend their work. The

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second part of the book explores up-to-date applications of electromagnetic waves—including radiometry, geophysical remote sensing and imaging, and biomedical and signal processing applications. Written by a world renowned authority in the field of electromagnetic research, this new edition of *Electromagnetic Wave Propagation, Radiation, and Scattering: From Fundamentals to Applications* presents detailed applications with useful appendices, including mathematical formulas, Airy function, Abel's equation, Hilbert transform, and Riemann surfaces. The book also features newly revised material that focuses on the following topics: Statistical wave theories—which have been extensively applied to topics such as geophysical remote sensing, bio-electromagnetics, bio-optics, and bio-ultrasound imaging Integration of several

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distinct yet related disciplines, such as statistical wave theories, communications, signal processing, and time reversal imaging New phenomena of multiple scattering, such as coherent scattering and memory effects Multiphysics applications that combine theories for different physical phenomena, such as seismic coda waves, stochastic wave theory, heat diffusion, and temperature rise in biological and other media Metamaterials and solitons in optical fibers, nonlinear phenomena, and porous media Primarily a textbook for graduate courses in electrical engineering, Electromagnetic Wave Propagation, Radiation, and Scattering is also ideal for graduate students in bioengineering, geophysics, ocean engineering, and geophysical remote sensing. The book is also a useful reference for engineers and scientists working in fields such as geophysical

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remote sensing, bio-medical engineering in optics and ultrasound, and new materials and integration with signal processing.

Foundations of Applied Electrodynamics takes a fresh look at the essential concepts and methods of electrodynamics as a whole, uniting the most relevant contemporary topics under a common mathematical framework. It contains clear explanations of high-level concepts as well as the mutual relationships between the essential ideas of electromagnetic theory. Starting with the fundamentals of electrodynamics, it methodically covers a wide spectrum of research and applications that stem from electromagnetic phenomena, before concluding with more advanced topics such as quantum mechanics. Includes new advances and methodologies in applied electrodynamics, and provides the whole

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picture of the theory of electrodynamics in most active areas of engineering applications Systematically deals with eigenvalue problems, integral equation formulations and transient phenomena in various areas of applied electrodynamics Introduces the complete theory of spherical vector wave functions, and presents the upper bounds of the product of gain and bandwidth for an arbitrary antenna Presents the field approach to multiple antenna system, which provides a theoretical tool for the prediction of channel models of MIMO, and is also the basis of wireless power transmission system One of the first books on electromagnetics that contains the general theory of relativity, which is needed in the design of mobile systems such as global positioning system (GPS) By summarising both engineering and theoretical electromagnetism in one volume, this book

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is an essential reference for practicing engineers, as well as a guide for those who wish to advance their analytical techniques for studying applied electrodynamics.

Calculus on Manifolds

Iterative Methods for Sparse Linear Systems

Fundamentals and Applications

Introduction to Classical Mechanics

Foundations of Applied Electrodynamics

***This monograph provides a framework for students and practitioners who are working on the solution of electromagnetic imaging in geophysics. Bridging the gap between theory and practical applied material (for example, inverse and forward problems), it provides a simple explanation of finite volume discretization, basic concepts in solving inverse***

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***problems through optimization, a summary of applied electromagnetics methods, and MATLAB code for efficient computation.***

***Analytical Modeling in Applied Electromagnetics encompasses the most complete treatment on the subject published to date, focusing on the nature of models in radio engineering. This leading-edge resource brings you detailed coverage of the latest topics, including metamaterials, photonic bandgaps and artificial impedance surfaces, and applies these concepts to a wide range of applications. The book provides you with working examples that are mainly directed to antenna applications, but the modeling methods and results can be used***

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**for other practical devices as well.  
CD-ROM contains: Demonstration  
exercises -- Complete solutions --  
Problem statements.**

**With over 30 years of experience in  
both industrial and university  
settings, the author covers the most  
widespread logic design practices  
while building a solid foundation of  
theoretical and engineering  
principles for students to use as  
they go forward in this fast moving  
field.**

**Fundamentals of Applied  
Electromagnetics, Global Edition  
Concepts and Fundamentals  
Modern Electrodynamics  
Microwave Engineering  
Second Edition**

This is the eBook of the printed  
book and may not include any



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media, website access codes, or print supplements that may come packaged with the bound book. Fundamentals of Electromagnetics for Electrical and Computer Engineering, First Edition is appropriate for all beginning courses in electromagnetics, in both electrical engineering and computer engineering programs. This is ideal for anyone interested in learning more about electromagnetics. Dr. N. Narayana Rao has designed this compact, one-semester textbook in electromagnetics to fully reflect the evolution of technologies in both electrical and computer engineering. This book's unique approach begins with Maxwell's equations for time-

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varying fields (first in integral and then in differential form), and also introduces waves at the outset.

Building on these core concepts, Dr. Rao treats each category of fields as solutions to Maxwell's equations, highlighting the frequency behavior of physical structures. Next, he systematically introduces the topics of transmission lines, waveguides, and antennas. To keep the subject's geometry as simple as possible, while ensuring that students master the physical concepts and mathematical tools they will need, Rao makes extensive use of the Cartesian coordinate system. Topics covered in this book include:  
uniform plane wave propagation;

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material media and their interaction with uniform plane wave fields; essentials of transmission-line analysis (both frequency- and time-domain); metallic waveguides; and Hertzian dipole field solutions.

Material on cylindrical and spherical coordinate systems is presented in appendices, where it can be studied whenever relevant or convenient.

Worked examples are presented throughout to illuminate (and in some cases extend) key concepts; each chapter also contains a summary and review questions.

(Note: this book provides a one-semester alternative to Dr. Rao's classic textbook for two-semester courses, *Elements of Engineering*

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Electromagnetics, now in its Sixth Edition.)

Electric Machinery Fundamentals continues to be a best-selling machinery text due to its accessible, student-friendly coverage of the important topics in the field.

Chapman's clear writing persists in being one of the top features of the book. Although not a book on MATLAB, the use of MATLAB has been enhanced in the fourth edition. Additionally, many new problems have been added and remaining ones modified. Electric Machinery Fundamentals is also accompanied by a website that provides solutions for instructors, as well as source code, MATLAB tools, and links to

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important sites for students.

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 encompasses nearly all facets of microwave engineering, but also gives all topics—including microwave generation, measurement, and processing—equal emphasis. Packed with illustrations to aid in comprehension, the book:

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Describes the mathematical theory of waveguides and ferrite devices, devoting an entire chapter to the Smith chart and its applications

Discusses different types of microwave components, antennas, tubes, transistors, diodes, and parametric devices Examines

various attributes of cavity resonators, semiconductor and RF/microwave devices, and microwave integrated circuits

Addresses scattering parameters and their properties, as well as planar structures including striplines and microstrips Considers the limitations of conventional tubes, behavior of charged particles in different fields, and the concept of velocity

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modulation Based on the author's own class notes, Microwave Engineering: Concepts and Fundamentals consists of 16 chapters featuring homework problems, references, and numerical examples. PowerPoint® slides and MATLAB®-based solutions are available with qualifying course adoption.

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. Fundamentals of Applied Electromagnetics is intended for use in one- or two-semester courses in electromagnetics. It also serves as a

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reference for engineers. Widely acclaimed both in the U.S. and abroad, this authoritative text bridges the gap between circuits and new electromagnetics material.

Ulaby begins coverage with transmission lines, leading students from familiar concepts into more advanced topics and applications. A user-friendly approach, full-color figures and images, and a set of interactive simulations will help readers understand the concepts presented.

An Introduction

Analytical Modeling in Applied  
Electromagnetics

Principles of Modern

Communication Systems



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Engineering Electromagnetics

Applied Electromagnetics

*Electromagnetics (CC BY-SA 4.0) is an open textbook intended to serve as a primary textbook for a one-semester first course in undergraduate engineering electromagnetics, and includes: electric and magnetic fields; electromagnetic properties of materials; electromagnetic waves; and devices that operate according to associated electromagnetic principles including resistors, capacitors, inductors, transformers, generators, and transmission lines. This book employs the "transmission lines first" approach, in which transmission lines are introduced*

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*using a lumped-element equivalent circuit model for a differential length of transmission line, leading to one-dimensional wave equations for voltage and current. This book is intended for electrical engineering students in the third year of a bachelor of science degree program. A free electronic version of this book is available at:*

*<https://doi.org/10.7294/W4WQ01Z>*  
*M*

*Retaining the features that made previous editions perennial favorites, Fundamental Mechanics of Fluids, Third Edition illustrates basic equations and strategies used to analyze fluid dynamics, mechanisms, and behavior, and offers solutions to fluid flow*

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*dilemmas encountered in common engineering applications. The new edition contains completely reworked line drawings, revised problems, and extended end-of-chapter questions for clarification and expansion of key concepts. Includes appendices summarizing vectors, tensors, complex variables, and governing equations in common coordinate systems Comprehensive in scope and breadth, the Third Edition of Fundamental Mechanics of Fluids discusses: Continuity, mass, momentum, and energy One-, two-, and three-dimensional flows Low Reynolds number solutions Buoyancy-driven flows Boundary layer theory Flow measurement*

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*Surface waves Shock waves*  
*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*

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*advantage of MATLAB's power to motivate and reinforce EM Principles. No other EM books 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. This well-known undergraduate electrodynamics textbook is now available in a more affordable printing from Cambridge University Press. The Fourth Edition provides a rigorous, yet clear and accessible treatment of the fundamentals of electromagnetic theory and offers a sound platform for explorations of related applications (AC circuits, antennas, transmission lines,*

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*plasmas, optics and more). Written keeping in mind the conceptual hurdles typically faced by undergraduate students, this textbook illustrates the theoretical steps with well-chosen examples and careful illustrations. It balances text and equations, allowing the physics to shine through without compromising the rigour of the math, and includes numerous problems, varying from straightforward to elaborate, so that students can be assigned some problems to build their confidence and others to stretch their minds. A Solutions Manual is available to instructors teaching from the book; access can be requested from the resources section at [www.cambridg](http://www.cambridg)*

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