Introduction To Medical Imaging Physics Engineering And Clinical Applications Cambridge Texts In Biomedical Engineering

Comprehensive, highly illustrated text and website giving underlying mathematical and physical basis of each imaging modality, for scientists and clinicians. The NATO Advanced Study Institute (ASI) on Physics and Engineering of Medical Imaging has addressed a subject which in the wide area of biomedical technology is one of those which are showing greater impact in the practice of medicine for the ability to picture both Anatomy and Physiology. The information and accuracy obtained by whatever imaging methodology is a complex result of a multidisciplinary effort of several sciences such as Physics, Engineering, Electronics, Chemistry, Medicine, etc ... Development has occurred through work performed in different environments such as basic and applied research laboratories, industries and clinical centers, with the aim of achieving an efficient transfer of know-how and technology for the improvement of both investigation possibilities and health care. On one hand, such an effort requires an ever-increasing committment of human and financial resources at research and industrial level, and, on the other, it

meets serious difficulties in recruiting the necessary human expertise oriented to this technology which breaks with the tradi tiona I academic borders of the single disciplines. Furthermore, the scientific community is continually dealing with the problem of increasing the performance and, at the same time, complexity and costs of instruments, applying more and more sophisticated technology in an effort to meet the demand for more complete and accurate clinical information. The scientific program of this ASI and the qualification of the authors reveals the intrinsic complexity of the development process of the Imaging methodologies.

Present Your Research to the World! The World Congress 2009 on Medical Physics and Biomedical Engineering – the triennial scientific meeting of the IUPESM - is the world's leading forum for presenting the results of current scientific work in health-related physics and technologies to an international audience. With more than 2,800 presentations it will be the biggest conference in the fields of Medical Physics and Biomedical Engineering in 2009! Medical physics, biomedical engineering and bioengineering have been driving forces of innovation and progress in medicine and healthcare over the past two decades. As new key technologies arise with significant potential to open new options in diagnostics and therapeutics, it is a multidisciplinary task to evaluate their benefit for

medicine and healthcare with respect to the quality of performance and therapeutic output. Covering key aspects such as information and communication technologies, micro- and nanosystems, optics and biotechnology, the congress will serve as an inter- and multidisciplinary platform that brings together people from basic research, R&D, industry and medical application to discuss these issues. As a major event for science, medicine and technology the congress provides a comprehensive overview and in–depth, first-hand information on new developments, advanced technologies and current and future applications. With this Final Program we would like to give you an overview of the dimension of the congress and invite you to join us in Munich! Olaf Dössel Congress President Wolfgang C.

The new edition of the excellent introduction to basic concepts and instrumentation of nuclear medicine, featuring numerous high-quality illustrations and practical examples Essentials of Nuclear Medicine Physics, Instrumentation, and Radiation Biology provides a concise, highly illustrated introduction to fundamental nuclear medicine-related physics and engineering concepts. Gradually progressing from basic principles to more advanced topics, this book offers clear guidance on basic physics related to nuclear medicine, gamma camera imaging and image reconstruction, x-ray computed tomography, magnetic resonance imaging, radiopharmaceutic

therapy, radiation dosimetry and safety, quality control, information technology, and more. Throughout the text, a wealth of examples illustrate the practice of nuclear medicine in the real world. This new fourth edition features fully revised content throughout, including brand-new chapters on basic MRI physics and instrumentation as well as radiopharmaceutical therapy. There are expanded discussions of current nuclear medicine technologies including positron emission tomography (PET) and single-photon emission computed tomography (SPECT), as well as up-to-date coverage of SPECT-CT, PET-CT hybrid scanning systems with an introduction to PET-MRI hybrid systems. Essential reading for anyone entering the field of nuclear medicine, this book: Contains introductory chapters on relevant atomic structure, methods of radionuclide production, and the interaction of radiation with matter Describes the basic function of the components of scintillation and non-scintillation detectors Details image acquisition and processing for planar and SPECT gamma cameras and PET scanners, and introduces acquisition and processing for CT and MRI scanners Discusses digital imaging and communications in medicine (DICOM) and picture archiving and communication systems (PACs) Includes a new chapter on radiopharmaceutical theranostics imaging and therapy Includes new coverage of quality control

procedures and updated chapters on radiation safety practices, radiation biology, and management of radiation accident victims Essentials of Nuclear Medicine Physics, Instrumentation, and Radiation Biology is a must-have for all residents, fellows, trainees, and students in nuclear medicine, and a valuable quick-reference for radiologists and nuclear medicine physicians and technologists.

This second edition has been fully updated to provide radiologists with all the recent technological advances in diagnostic radiology. Divided into six sections, it covers all the key aspects of the imaging – ultrasound, computed tomography, magnetic resonance imaging, radiography and interventional radiography, and contrast media. The final section discusses miscellaneous topics including evidence based radiology, radiation protection, molecular imaging, planning a modern imaging department, and common drugs used. A separate chapter is dedicated to picture archiving and data management. This comprehensive new edition includes nearly 600 full colour radiological images and illustrations. Key points Fully updated, new edition presenting recent technological advances in diagnostic radiology Covers all key imaging techniques Includes nearly 600 radiological photographs and illustrations Previous edition published in 2007

Noninvasive medical diagnosis (NIMD) is as old as

medical practice itself. From the earliest healers' observations of odors, skin color, and breath sounds to today's wealth of technologies, the basics remain the same and keep the role of NIMD essential to effective medical care. Noninvasive Instrumentation and Measurement in Medical Diagnos

Although students are not formally examined in medical imaging, they do need to develop the skill of interpreting the images and scans used in clinical work. 'Imaging for Students' is didactic and user-friendly with large, high-quality images, explanatory captions and the text presented mostly in tables and note form. The book is divided into 4 parts: Part I introduces basic concepts; Part II deals with plain film interpretation and common signs to look for; Part III deals with advanced radiological tests and procedures (e.g. Ultrasound, CT, MRI, Nuclear Medicine and Interventional Radiology), the physics of each, plus advantages, disadvantages and limitations are discussed; Part IV outlines the use of radiological tests in common clinical situations within systems-based chapters.

Biomedical imaging is a relatively young discipline that started with Conrad Wilhelm Roentgen’s discovery of the x-ray in 1895. X-ray imaging was rapidly adopted in hospitals around the world. However, it was the advent of computerized data and image processing that made revolutionary new imaging modalities possible. Today, cross-sections

and three-dimensional reconstructions of the organs inside the human body is possible with unprecedented speed, detail and quality. This book provides an introduction into the principles of image formation of key medical imaging modalities: X-ray projection imaging, x-ray computed tomography, magnetic resonance imaging, ultrasound imaging, and radionuclide imaging. Recent developments in optical imaging are also covered. For each imaging modality, the introduction into the physical principles and sources of contrast is provided, followed by the methods of image formation, engineering aspects of the imaging devices, and a discussion of strengths and limitations of the modality. With this book, the reader gains a broad foundation of understanding and knowledge how today's medical imaging devices operate. In addition, the chapters in this book can serve as an entry point for the in-depth study of individual modalities by providing the essential basics of each modality in a comprehensive and easy-to-understand manner. As such, this book is equally attractive as a textbook for undergraduate or graduate biomedical imaging classes and as a reference and self-study guide for more specialized in-depth studies.

"This textbook provides an accessible introduction to the basic principles of medical physics, the applications of medical physics equipment, and the role of a medical physicist in healthcare. Introduction to Medical Physics is

designed to support undergraduate and graduate students taking their first modules on a medical physics course, or as a dedicated book for specific modules such as medical imaging and radiotherapy. It is ideally suited for new teaching schemes such as Modernising Scientific Careers and will be invaluable for all medical physics students worldwide. Key features: Written by an experienced and senior team of medical physicists from highly respected institutions The first book written specifically to introduce medical physics to undergraduate and graduate physics students Provides worked examples relevant to actual clinical situations"--

This book begins with the basic terms and definitions and takes a student, step by step, through all areas of medical physics. The book covers radiation therapy, diagnostic radiology, dosimetry, radiation shielding, and nuclear medicine, all at a level suitable for undergraduates. This title not only describes the basics concepts of the field, but also emphasizes numerical and mathematical problems and examples. Students will find An Introduction to Medical Physics to be an indispensible resource in preparations for further graduate studies in the field.

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This publication provides an up to date educational resource which will enable clinicians practising or training in intensive care, emergency medicine or anaesthesia to interpret patients' imaging investigations. The book is based on a series of problems about critically ill patients. The problems, which are of varying degree of difficulty, begin with a brief clinical history and an image or series of images; questions are asked about the images and answers are provided on the

facing page. The book will also be useful for doctors from a broad range of specialities whose patients come to the ICU, including surgeons and physicians, as well as radiology trainees.

- Covers the entire field of medical imaging at an introductory level - Provides a brief description of the clinical context of imaging for students with an engineering background - Provides a descriptive, non-mathematical background to the physics underpinning imaging for students with a medical background - Includes exercises and problems at the end of every chapter to test readers' understanding of the material

This book aims to demystify fundamental biophysics for students in the health and biosciences required to study physics and to understand the mechanistic behaviour of biosystems. The text is well supplemented by worked conceptual examples that will constitute the main source for the students, while combining conceptual examples and practice problems with more quantitative examples and recent technological advances.

Developed from the authors' highly successful annual imaging physics review course, this new Second Edition gives readers a clear, fundamental understanding of the theory and applications of physics in radiology, nuclear medicine, and radiobiology. The Essential Physics of Medical Imaging, Second Edition provides key coverage of the clinical implications of technical principles--making this book great for board review. Highlights of this new edition include completely updated and expanded chapters and more than 960 illustrations. Major sections cover basic concepts, diagnostic radiology, nuclear medicine, and radiation protection, dosimetry, and biology. A Brandon-Hill recommended title.

A prize-winning medical writer offers an explanation of modern diagnostic medical imaging technologies—and the

issues that result from their use and misuse. • Various charts and illustrations show medical imaging modalities, Medicare medical imaging costs, distribution of imaging costs, physicians' fees by modality, nuclear imaging probes, and medical imaging physics • A glossary defines key terms necessary to understanding medical imaging technology such as "positron," "half-life," and "tomography," as well as acronyms such as "MRI,", "PET," "SPECT," and "CT" • Presents documents including early popular science articles on X-ray technology and its abuse

This work covers the medical physics option for the EDEXCEL syllabus. It covers topics such as magnetic resonance imaging, ultrasound, X-ray and nuclear medicine. Included is a section of exam questions helping students to prepare thoroughly.

This textbook, intended for advanced undergraduate and graduate students, is an introduction to the physical and mathematical principles used in clinical medical imaging. The first two chapters introduce basic concepts and useful terms used in medical imaging and the tools implemented in image reconstruction, while the following chapters cover an array of topics such as: physics of x-rays and their implementation in planar and computed tomography (CT) imaging;nuclear medicine imaging and the methods of forming functional planar and single photon emission computed tomography (SPECT) images and Clinical imaging using positron emitters as radiotracers. The book also discusses the principles of MRI pulse sequencing and signal

generation, gradient fields, and the methodologies implemented for image formation, form flow imaging and magnetic resonance angiography and the basic physics of acoustic waves, the different acquisition modes used in medical ultrasound, and the methodologies implemented for image formation and for flow imaging using the Doppler Effect. By the end of the book, readers will know what is expected from a medical image, will comprehend the issues involved in producing and assessing the quality of a medical image, will be able to conceptually implement this knowledge in the development of a new imaging modality, and will be able to write basic algorithms for image reconstruction. Knowledge of calculus, linear algebra, regular and partial differential equations, and a familiarity with the Fourier transform and it applications is expected, along with fluency with computer programming. The book contains exercises, homework problems, and sample exam questions that are exemplary of the main concepts and formulae students would encounter in a clinical setting.

From x-rays to lasers to magnetic resonance imaging, developments in basic physics research have been transformed into medical technologies for imaging, surgery and therapy at an ever accelerating pace. Physics has joined with genetics and molecular biology to define much of what is modern in modern medicine. Covering a wide range of

applications, Introduction to Physics in Modern Medicine, Second Edition builds on the bestselling original. Based on a course taught by the author, the book provides medical personnel and students with an exploration of the physics-related applications found in state-of-the-art medical centers. Requiring no previous acquaintance with physics, biology, or chemistry and keeping mathematics to a minimum, the application-dedicated chapters adhere to simple and self-contained qualitative explanations that make use of examples and illustrations. With an enhanced emphasis on digital imaging and computers in medicine, the text gives readers a fundamental understanding of the practical application of each concept and the basic science behind it. This book provides medical students with an excellent introduction to how physics is applied in medicine, while also providing students in physics with an introduction to medical physics. Each chapter includes worked examples and a complete list of problems and questions. That so much of the technology discussed in this book was the stuff of dreams just a few years ago, makes this book as fascinating as it is practical, both for those in medicine as well as those in physics who might one day discover that the project they are working on is basis for the next great medical application. This edition: Covers hybrid scanners for cancer imaging and the interplay of molecular medicine with imaging

technologies such as MRI, CT and PET Looks at camera pills that can film from the inside upon swallowing and advances in robotic surgery devices Explores Intensity-Modulated Radiation Therapy, proton therapy, and other new forms of cancer treatment Reflects on the use of imaging technologies in developing countries

This book introduces the fundamental aspects of digital imaging and covers four main themes: ultrasound techniques and imaging applications, magnetic resonance and MPJ in hospital, digital imaging with X-rays, and emission tomography (PET and SPECT). Each topic is developed by analyzing the underlying physics principles and their implementation, quality and safety aspects, clinical performance, and recent advancements in the field.

An excellent introduction to the basic concepts of nuclear medicine physics This Third Edition of Essentials of Nuclear Medicine Physics and Instrumentation expands the finely developed illustrated review and introductory guide to nuclear medicine physics and instrumentation. Along with simple, progressive, highly illustrated topics, the authors present nuclear medicine-related physics and engineering concepts clearly and concisely. Included in the text are introductory chapters on relevant atomic structure, methods of radionuclide production, and the interaction of radiation with matter. Further, the text discusses the basic function

of the components of scintillation and non-scintillation detector systems. An information technology section discusses PACs and DICOM. There is extensive coverage of quality control procedures, followed by updated chapters on radiation safety practices, radiation biology, and management of radiation accident victims. Clear and concise, this new edition of Essentials of Nuclear Medicine Physics and Instrumentation offers readers: Four new chapters Updated coverage of CT and hybrid scanning systems: PET/CT and SPECT/CT Fresh discussions of the latest technology based on solid state detectors and new scanner designs optimized for dedicated cardiac imaging New coverage of PACs and DICOM systems Expanded coverage of image reconstruction and processing techniques New material on methods of image display Logically structured and clearly written, this is the book of choice for anyone entering the field of nuclear medicine, including nuclear medicine residents and fellows, cardiac nuclear medicine fellows, and nuclear medicine technology students. It is also a handy quick-reference guide for those already working in the field of nuclear physics.

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This introduction to medical imaging introduces all of the major medical imaging techniques in wide use in both medical practice and medical research,

including Computed Tomography, Ultrasound, Positron Emission Tomography, Single Photon Emission Tomography and Magnetic Resonance Imaging. Principles of Medical Imaging for Engineers introduces fundamental concepts related to why we image and what we are seeking to achieve to get good images, such as the meaning of 'contrast' in the context of medical imaging. This introductory text separates the principles by which 'signals' are generated and the subsequent 'reconstruction' processes, to help illustrate that these are separate concepts and also highlight areas in which apparently different medical imaging methods share common theoretical principles. Exercises are provided in every chapter, so the student reader can test their knowledge and check against worked solutions and examples. The text considers firstly the underlying physical principles by which information about tissues within the body can be extracted in the form of signals, considering the major principles used: transmission, reflection, emission and resonance. Then, it goes on to explain how these signals can be converted into images, i.e., full 3D volumes, where appropriate showing how common methods of 'reconstruction' are shared by some imaging methods despite relying on different physics to generate the 'signals'. Finally, it examines how medical imaging can be used to generate more than just pictures, but genuine quantitative

measurements, and increasingly measurements of physiological processes, at every point within the 3D volume by methods such as the use of tracers and advanced dynamic acquisitions. Principles of Medical Imaging for Engineers will be of use to engineering and physical science students and graduate students with an interest in biomedical engineering, and to their lecturers.

This comprehensive publication covers all aspects of image formation in modern medical imaging modalities, from radiography, fluoroscopy, and computed tomography, to magnetic resonance imaging and ultrasound. It addresses the techniques and instrumentation used in the rapidly changing field of medical imaging. Now in its fourth edition, this text provides the reader with the tools necessary to be comfortable with the physical principles, equipment, and procedures used in diagnostic imaging, as well as appreciate the capabilities and limitations of the technologies.

Clinical Imaging Physics: Current and Emerging Practice is the first text of its kind—a comprehensive reference work covering all imaging modalities in use in clinical medicine today. Destined to become a classic in the field, this book provides state-of-practice descriptions for each imaging modality, followed by special sections on new and emerging applications, technologies, and practices. Authored by luminaries in the field of medical physics, this resource is a sophisticated, one-volume

handbook to a fast-advancing field that is becoming ever more central to contemporary clinical medicine. Summarizes the current state of clinical imaging physics in one-volume, with a focus on emerging technologies and applications Provides comprehensive coverage of all key clinical imaging modalities, taking into account the new realities in healthcare practice Features a strong focus on clinical application of principles and technology, now and in the future Contains authoritative text compiled by world-renowned editors and contributors responsible for guiding the development of the field Practicing radiologists and medical physicists will appreciate Clinical Imaging Physics as a peerless everyday reference work. Additionally, graduate students and residents in medical physics and radiology will find this book essential as they study for their board exams. Since the publication of the best-selling, highly acclaimed first edition, the technology and clinical applications of medical imaging have changed significantly. Gathering these developments into one volume, Webb's Physics of Medical Imaging, Second Edition presents a thorough update of the basic physics, modern technology and many examples of clinical application across all the modalities of medical imaging. New to the Second Edition Extensive updates to all original chapters Coverage of state-of-the-art detector technology and computer processing used in medical imaging 11 new contributors in addition to the original team of authors Two new chapters on medical image processing and multimodality imaging More than 50 percent new examples and over 80 percent new figures Glossary of

abbreviations, color insert and contents lists at the beginning of each chapter Keeping the material accessible to graduate students, this well-illustrated book reviews the basic physics underpinning imaging in medicine. It covers the major techniques of x-radiology, computerised tomography, nuclear medicine, ultrasound and magnetic resonance imaging, in addition to infrared, electrical impedance and optical imaging. The text also describes the mathematics of medical imaging, image processing, image perception, computational requirements and multimodality imaging.

Over recent years there has been a vast expansion in the variety of imaging techniques available, and developments in machine specifications continue apace. If radiologists and radiographers are to obtain optimal image quality while minimising exposure times, a good understanding of the fundamentals of the radiological science underpinning diagnostic imaging is essential. The second edition of this well-received textbook continues to cover all technical aspects of diagnostic radiology, and remains an ideal companion during examination preparation and beyond. The content includes a review of basic science aspects of imaging, followed by a detailed explanation of radiological sciences, conventional x-ray image formation and other imaging techniques. The enormous technical advances in computed tomography, including multislice acquisition and 3D image reconstruction, digital imaging in the form of image plate and direct radiography, magnetic resonance imaging, colour flow imaging in ultrasound and positron radiopharmaceuticals in nuclear medicine,

are all considered here. A chapter devoted to computers in radiology considers advances in radiology information systems and computer applications in image storage and communication systems. The text concludes with a series of general topics relating to diagnostic imaging. The content has been revised and updated throughout to ensure it remains in line with the Fellowship of the Royal College of Radiologists (FRCR) examination, while European and American perspectives on technology, guidelines and regulations ensure international relevance.

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A succinct introduction to the physics and function of magnetic resonance imaging with an emphasis on practical information. This thoroughly revised second edition is clearly structured. The underlying physical principles of the MR experiment are described and the basic pulse sequences commonly used in clinical MRI. It progresses to more advanced techniques such as parallel imaging and cardiovascular MR imaging. An extensive glossary offers rapid access to MRI terminology and will help those seeking to understand this interesting fascinating subject.

In this book, Carolyn A. MacDonald provides a comprehensive introduction to the physics of a wide range of x-ray applications, optics, and analysis tools. Theory is applied to practical considerations of optics and applications ranging from astronomy to medical imaging and materials analysis. Emphasizing common

physical concepts that underpin diverse phenomena and applications of x-ray physics, the book opens with a look at nuclear medicine, motivating further investigations into scattering, detection, and noise statistics. The second section explores topics in x-ray generation, including characteristic emission, x-ray fluorescence analysis, bremsstrahlung emission, and synchrotron and laser sources. The third section details the main forms of interaction, including the physics of photoelectric absorption, coherent and Compton scattering, diffraction, and refractive, reflective, and diffractive optics. Applications in this section include x-ray spectroscopy, crystallography, and dose and contrast in radiography. A bibliography is included at the end of every chapter, and solutions to chapter problems are provided in the appendix. Based on a course for advanced undergraduates and graduate students in physics and related sciences and also intended for researchers, An Introduction to X-Ray Physics, Optics, and Applications offers a thorough survey of the physics of x-ray generation and of interaction with materials.Common aspects of diverse phenomena emphasizedTheoretical development tied to practical applications Suitable for advanced undergraduate and graduate students in physics or related sciences, as well as researchersExamples and problems include applications drawn from medicine, astronomy, and materials analysisDetailed solutions are provided for all examples and problems.

Medical Physics and Biomedical Engineering provides broad coverage appropriate for senior undergraduates

and graduates in medical physics and biomedical engineering. Divided into two parts, the first part presents the underlying physics, electronics, anatomy, and physiology and the second part addresses practical applications. The structured approach means that later chapters build and broaden the material introduced in the opening chapters; for example, students can read chapters covering the introductory science of an area and then study the practical application of the topic. Coverage includes biomechanics; ionizing and nonionizing radiation and measurements; image formation techniques, processing, and analysis; safety issues; biomedical devices; mathematical and statistical techniques; physiological signals and responses; and respiratory and cardiovascular function and measurement. Where necessary, the authors provide references to the mathematical background and keep detailed derivations to a minimum. They give comprehensive references to junior undergraduate texts in physics, electronics, and life sciences in the bibliographies at the end of each chapter.

"While covering both physical and mathematical foundations, this graduate textbook provides the reader with a comprehensive introduction into modern biomedical imaging techniques. These methods are not only based on new instrumentation for image capture, but equally on mathematical advances in the algorithms to extract relevant information from recorded data. As a first, this book provides a combined treatise of these underlying aspects"--

With more than 1,000 high-quality radiographs and

illustrations, Oral Radiology: Principles and Interpretation, 7th Edition visually demonstrates the basic principles of oral and maxillofacial radiology along with their clinical application. First, you'll gain a solid foundation in radiation physics, radiation biology, and radiation safety and protection. Then you'll learn intraoral and extraoral imaging techniques, including specialized techniques such as MRI and CT. The second half of the book focuses on how to recognize the radiographic features of pathologic conditions and interpret radiographs accurately. This edition also includes new chapters on forensics and cone-beam imaging. Written by oral radiology experts Stuart White and Michael Pharoah, this bestselling book helps you provide state-of-the-art care! An easy-to-follow format simplifies the key radiographic features of each pathologic condition, including location, periphery, shape, internal structure, and effects on surrounding structures - placed in context with clinical features, differential diagnosis, and management.UPDATED information addresses the etiology and diagnosis of diseases and pathologic conditions in the orofacial region.Updated coverage of all aspects of oral radiology includes the entire predoctoral curriculum.A wide array of radiographs including advanced imaging such as MRI and CT.Hundreds of drawings are updated and rendered in full color.Case studies apply imaging concepts to real-world scenarios. Expert contributors include many authors with worldwide reputations.Chapter bibliographies and suggested readings make it easier to conduct further research. NEW chapter on cone-beam imaging keeps you current

with emerging field requirements.NEW coverage of cone beam computed tomography (CBCT) includes more of the normal anatomy of cross-sectional images of the maxilla and mandible along with variations of normal anatomy.NEW! An eBook version makes the content interactive and portable, and shows radiographs in high resolution.

This book provides a review of image analysis techniques as they are applied in the field of diagnostic and therapeutic nuclear medicine. Driven in part by the remarkable sophistication of nuclear medicine instrumentation and - crease in computing power and its ready and inexpensive availability, this is a relatively new yet rapidly expanding field. Likewise, although the use of nuclear imaging for diagnosis and therapy has origins dating back almost to the pioneering work of Dr G. de Hevesy, quantitative imaging has only recently emerged as a promising approach for diagnosis and therapy of many diseases. An effort has, therefore, been made to place the reviews provided in this book in a broader context. The effort to do this is reflected by the inclusion of introductory chapters that address basic principles of nuclear medicine instrumentation and dual-modality imaging, followed by overview of issues that are closely related to quantitative nuclear imaging and its potential role in diagnostic and therapeutic applications. A brief overview of each chapter is provided below. Chapter 1 presents a general overview of nuclear medicine imaging physics and instrumentation including planar scintigraphy, single-photon emission computed tomography (SPECT) and positron emission tomography

(PET). Nowadays, patients' diagnosis and therapy is rarely done without the use of imaging technology. As such, imaging considerations are incorporated in almost every chapter of the book. The development of dual-modality - aging systems is an emerging research field, which is addressed in chapter 2.

Covering the basics of X-rays, CT, PET, nuclear medicine, ultrasound, and MRI, this textbook provides senior undergraduate and beginning graduate students with a broad introduction to medical imaging. Over 130 end-of-chapter exercises are included, in addition to solved example problems, which enable students to master the theory as well as providing them with the tools needed to solve more difficult problems. The basic theory, instrumentation and state-of-the-art techniques and applications are covered, bringing students immediately up-to-date with recent developments, such as combined computed tomography/positron emission tomography, multi-slice CT, four-dimensional ultrasound, and parallel imaging MR technology. Clinical examples provide practical applications of physics and engineering knowledge to medicine. Finally, helpful references to specialised texts, recent review articles, and relevant scientific journals are provided at the end of each chapter, making this an ideal textbook for a one-semester course in medical imaging.

Ionizing Radiation Detectors for Medical Imaging contains tentechnical chapters, half of which are devoted to radiology and theother half to nuclear medicine. The last chapter describes thedetectors for radiotherapy and portal imaging. Each chapter addressescompletely a

specific application. The emphasis is always on detectorfundamentals and detector properties. Where necessary, software andspecific applications are described in depth. This book is intended for graduate and undergraduate students inphysics and engineering who want to study medical imaging. Inaddition, scientists who are working in a specific sub-field ofmedical imaging can acquire from the book an up-to-date description ofthe state of the art in related sub-fields, within the scope ofionizing radiation detectors. Other scientists, as well as physicians, can use the book as a reference for medical imaging

Acoustical imaging has become an indispensable tool in a variety of fields. Since its introduction, the applications have grown and cover a variety of techniques, producing significant results in fields as disparate as medicine and seismology. Cutting-edge trends continue to be discussed worldwide. This book contains the proceedings of the 27th International Symposium on Acoustical Imaging (AI27), which took place in Saarbrücken, Germany, from March 24th to March 27th 2003. The Symposium belongs to a conference series in existence since 1968. AI27 comprised sessions on: Medical Imaging, Non-Destructive Testing, Seismic Imaging, Physics and Mathematics of Acoustical Imaging, Acoustic Microscopy. During two well-attended workshops the applications of quantitative acoustical imaging in biology and medical applications, and in near-field imaging of materials, were discussed. Based on its cross-disciplinary aspects, the authors of the papers of AI27 present experiments, theory and construction of

new instruments.

An up-to-date edition of the authoritative text on the physics of medical imaging, written in an accessible format The extensively revised fifth edition of Hendee's Medical Imaging Physics, offers a guide to the principles, technologies, and procedures of medical imaging. Comprehensive in scope, the text contains coverage of all aspects of image formation in modern medical imaging modalities including radiography, fluoroscopy, computed tomography, nuclear imaging, magnetic resonance imaging, and ultrasound. Since the publication of the fourth edition, there have been major advances in the techniques and instrumentation used in the ever-changing field of medical imaging. The fifth edition offers a comprehensive reflection of these advances including digital projection imaging techniques, nuclear imaging technologies, new CT and MR imaging methods, and ultrasound applications. The new edition also takes a radical strategy in organization of the content, offering the fundamentals common to most imaging methods in Part I of the book, and application of those fundamentals in specific imaging modalities in Part II. These fundamentals also include notable updates and new content including radiobiology, anatomy and physiology relevant to medical imaging, imaging science, image processing, image display, and information technologies. The book makes an attempt to make complex content in accessible format with limited mathematical formulation. The book is aimed to be accessible by most professionals with lay readers interested in the subject. The book is also designed to be

of utility for imaging physicians and residents, medical physics students, and medical physicists and radiologic technologists perpetrating for certification examinations. The revised fifth edition of Hendee's Medical Imaging Physics continues to offer the essential information and insights needed to understand the principles, the technologies, and procedures used in medical imaging. The Physics of Medical Imaging reviews the scientific basis and physical principles underpinning imaging in medicine. It covers the major imaging methods of x-radiology, nuclear medicine, ultrasound, and nuclear magnetic resonance, and considers promising new techniques. Following these reviews are several thematic chapters that cover the mathematics of medical imaging, image perception, computational requirements, and techniques. Throughout the book, the author encourages readers to consider key questions concerning imaging. This profusely illustrated and extensively indexed text is accessible to graduate physical scientists, advanced undergraduates, and research students. It logically complements books on applications of imaging techniques in medicine, making it useful for clinicians as well.