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	Optical data processing
	Biomedical engineering
	Integral transforms
	Calculus, Operational
	Computer science—Mathematics
	Functional Analysis
	Imaging / Radiology
	Computer Imaging, Vision, Pattern Recognition and Graphics
	Biomedical Engineering and Bioengineering
	Integral Transforms, Operational Calculus
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Nota di contenuto	Preface to Second Edition.-Preface -- 1. X-rays -- 2. The Radon Transform -- 3. Back Projection -- 4. Complex Numbers -- 5. The Fourier Transform -- 6. Two Big Theorems -- 7. Filters and Convolution -- 8. Discrete Image Reconstruction -- 9. Algebraic Reconstruction Techniques -- 10. MRI—An Overview.-Appendix A. Integrability -- Appendix B. Matrices, Transposes, and Factorization -- Appendix C.Topics for Further Study -- Bibliography -- Index.
Sommario/riassunto	The basic mathematics of computerized tomography, the CT scan, are

aptly presented for an audience of undergraduates in mathematics and engineering. Assuming no prior background in advanced mathematical analysis, topics such as the Fourier transform, sampling, and discrete approximation algorithms are introduced from scratch and are developed within the context of medical imaging. A chapter on magnetic resonance imaging focuses on manipulation of the Bloch equation, the system of differential equations that is the foundation of this important technology. Extending the ideas of the acclaimed first edition, new material has been added to render an even more accessible textbook for course usage. This edition includes new discussions of the Radon transform, the Dirac delta function and its role in X-ray imaging, Kacmarz's method and least squares approximation, spectral filtering, and more. Copious examples and exercises, several new computer-based exercises, and additional graphics have been added to further delineate concepts. The use of technology has been revamped throughout with the incorporation of the open source programming environment R to illustrate examples and composition of graphics. All R code is available as extra source material on SpringerLink. From the reviews of the first edition: "This book is valuable, for it addresses with care and rigor the relevance of a variety of mathematical topics t o a real-world problem. …This book is well written. It serves its purpose of focusing a variety of mathematical topics onto a real-world application that is in its essence mathematics." –The Journal of Nuclear Medicine, Vol. 51 (12), December, 2010 "This new book by Timothy Feeman, truly intended to be a beginner's guide, makes the subject accessible to undergraduates with a working knowledge of multivariable calculus and some experience with vectors and matrix methods. …author handles the material with clarity and grace…" –The Mathematical Association of America, February, 2010 "All theoretical material is illustrated with carefully selected examples which are easy to follow. …I highly recommend this interesting, accessible to wide audience and well-written book dealing with mathematical techniques that support recent ground-breaking discoveries in biomedical technology both to students…and to specialists." – Zentralblatt MATH, Vol. 1191, 2010.