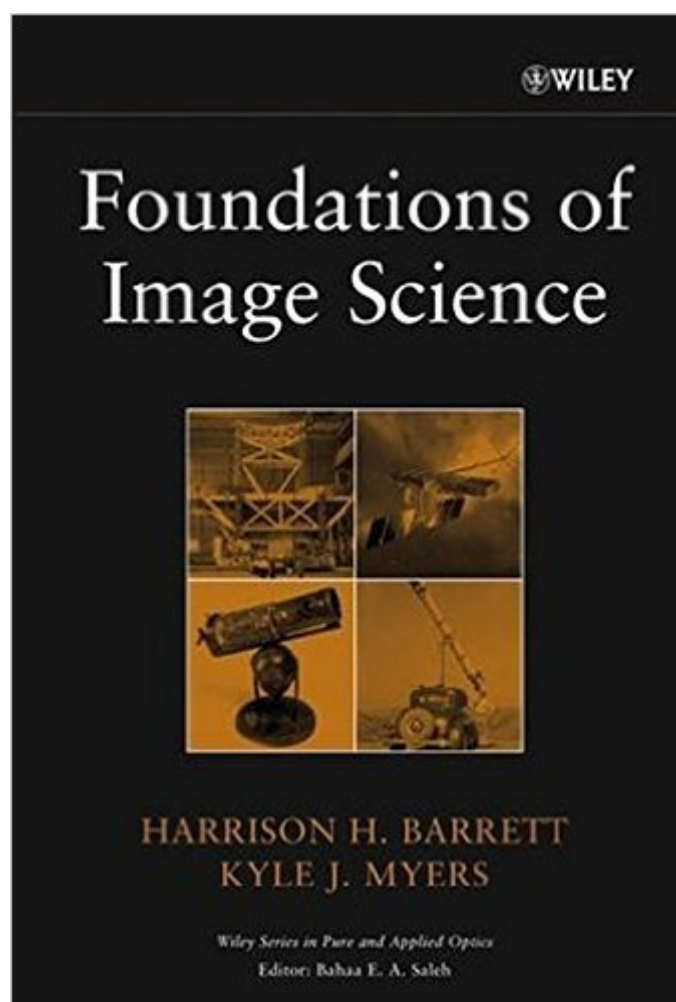


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# Foundations Of Image Science



## Synopsis

Winner of the 2006 Joseph W. Goodman Book Writing Award! A comprehensive treatment of the principles, mathematics, and statistics of image science In today's visually oriented society, images play an important role in conveying messages. From seismic imaging to satellite images to medical images, our modern society would be lost without images to enhance our understanding of our health, our culture, and our world. Foundations of Image Science presents a comprehensive treatment of the principles, mathematics, and statistics needed to understand and evaluate imaging systems. The book is the first to provide a thorough treatment of the continuous-to-discrete, or CD, model of digital imaging. Foundations of Image Science emphasizes the need for meaningful, objective assessment of image quality and presents the necessary tools for this purpose.

Approaching the subject within a well-defined theoretical and physical context, this landmark text presents the mathematical underpinnings of image science at a level that is accessible to graduate students and practitioners working with imaging systems, as well as well-motivated undergraduate students. Destined to become a standard text in the field, Foundations of Image Science covers:

**Mathematical Foundations:** Examines the essential mathematical foundations of image science  
**Image Formation** "Models and Mechanisms: Presents a comprehensive and unified treatment of the mathematical and statistical principles of imaging, with an emphasis on digital imaging systems and the use of SVD methods  
**Image Quality:** Provides a systematic exposition of the methodology for objective or task-based assessment of image quality  
**Applications:** Presents detailed case studies of specific direct and indirect imaging systems and provides examples of how to apply the various mathematical tools covered in the book  
**Appendices:** Covers the prerequisite material necessary for understanding the material in the main text, including matrix algebra, complex variables, and the basics of probability theory

## Book Information

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## Customer Reviews

This book always amazes me whenever I use it for the absolutely incredible amount of material that it covers in such depth. I had the tremendous good fortune to have taken a Physical Optics course with Prof. Barrett, and it would be impossible to believe that one person can know so much unless you have personally talked with him about science or had a class with him. The rumor in the department is that Dr. Barrett is the only professor to at one time or other have taught ALL of the department's core graduate courses during his career at the College of Optical Sciences.

Furthermore, he is one of the rare scientists who is an authority in his field both theoretically and experimentally, so you do not get a one-sided perspective as can often happen with science texts. The book reflects his vast knowledge, expertise, rigor, and thoroughness. Of course, the book has several chapters on mathematical formalism, including the linear algebra, Dirac delta function, Fourier theory, and group theory. The imaging theory is there, as well as diffraction theory. He covers photon statistics and detection, including the necessary quantum mechanics. He covers several advanced imaging concepts that I haven't any idea about myself. You probably could not find a more comprehensive book in the field of imaging and physical optics. Another benefit is that, at least for the chapters I have used, the individual chapters seem to stand well on their own and you are not forced to study the book in order. This book is not for the faint of heart in any respect. The material itself is not for the faint of heart: it is extremely rigorous and will require your careful attention, but I believe it is well explained and manageable for someone who is serious about learning it.

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