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# Photonics Essentials : An Introduction with Experiments

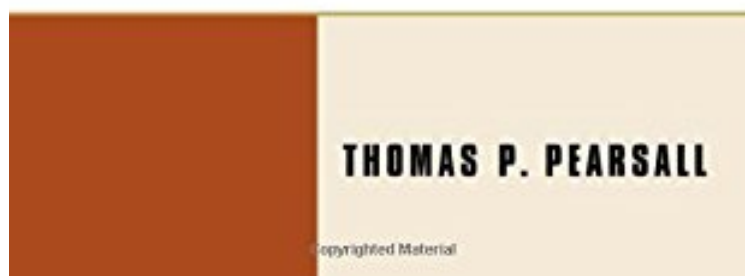
*Thomas P. Pearsall*

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## Photonics Essentials

**AN INTRODUCTION  
WITH EXPERIMENTS**



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**Thomas P. Pearsall : Photonics Essentials : An Introduction with Experiments** before purchasing it in order to gage whether or not it would be worth my time, and all praised Photonics Essentials : An Introduction with Experiments:

8 of 8 people found the following review helpful. A great book for learning PhotonicsBy A CustomerPhotonics

Essentials: An introduction with experiments by Tom Pearsall is a great book. Both students and working professionals in the field of photonics/optoelectronics will find the book useful. When I was a student of photonics, one of the difficulties was finding books that clearly explain the physics (not the math for deriving those equations) of photonic devices. To understand the physics of photonics devices, one typically needs to understand the band structure of semiconductor materials, current-voltage and capacitance-voltage characteristics of p-n junction diodes, and some simple concepts in optics. There has been no book that covers all these topics in an easy to understand fashion in one volume. Furthermore, books in photonics typically explain the theory but don't teach you how to verify the theory. Photonics Essentials by Tom Pearsall covers all the essential concepts and shows you how to verify the theory through experiments. Marvelous! The book starts by teaching the concept of the band structure of semiconductors. This was done in less than 30 pages in an easy to understand manner. The book then went on to discuss the physics (not the math) of photodiodes, photoconductors, light-emitting diodes, lasers and optical fibers. Every chapter explains how each device works through a discussion of the basic processes that happen in the device. Strategy and tricks on how to engineer the devices to make them better are also discussed. In the last two chapters, Tom discusses how to experimentally measure the basic characteristics of photonic devices covered in earlier chapters. This book doesn't hide behind the equations and theories. It teaches you the real thing and also shows you how to verify what you learned through experiments. This doesn't mean that the author doesn't understand the theory. Tom Pearsall, is fellow of both the IEEE and the American Physical Society. If you have met this guy and read his research papers, you know that he knows his theories. Tom, however, is also the inventor of InGaAsP photodetectors that we use for long distance telecom. He knows how to translate understanding of the theory into real devices. He also understands how one can be fooled by theory (read his story on the development of GaN blue lasers in chapter 7). It is great that someone like Tom finally wrote this book. I am glad that I got this book and read it. If you are a student that wants to learn about photonics or optoelectronic devices, read this book. If you are a working professional and want to refresh your understanding, read this book. You will love it.

4 of 5 people found the following review helpful. The experimenter's view  
By thomas krauss  
Photonics Essentials is a refreshingly different Photonics Textbook. It is clearly aimed at an undergraduate audience, although specialist readers may also find it useful, either to brush up on a topic or to have it explained in a clear, conceptual way, and from a different angle. This approach does not aim to replace conventional textbooks, but rather complements them with experimentally-motivated examples. Arguments are usually introduced via clearly understandable models and examples, and the light tone makes the subject more accessible. This, however, does not make the book superficial, the author instead focusses on the most relevant aspects and then backs them up with mathematical rigour. Another difference to existing literature is that it provides interesting insights into industrial reality, and sometimes quotes price as one of the parameters to enter the engineering equation. This provides a worthwhile reality-check, yet also some built-in obsolescence. The book encourages the student to develop new thinking and not to be put off by accepted "impossibilities", e.g in the discussion on GaN lasers. The characterisation section provides a useful background on the electrical properties of photonic devices, information that is not necessarily provided in photonics textbooks. The same applies to the explanation of the operation principle and practical use of lock-in amplifiers. Furthermore, showing "real" experimental measurement curves provides useful reference material for laboratory experiments. Overall, the book is clearly aimed at undergraduate students and engineers interested in understanding fundamental principles rather than scientists involved in cutting-edge research. With this scope in mind, it serves a worthwhile function and has identified a gap in the existing market that it fills with excellence.

Shedding light on the subject, this unique new book teaches photonics - electronic devices that manage light and electricity - through hands-on measurement techniques common to all photonic devices. Learn these techniques and you can characterize and understand any device and master the field. It includes discussions on Lasers, Photodiodes, LEDs, and Photoconductors. This practice-based tutorial, perfect for students and engineers looking for practical expertise rather than abstract theory, does more than explain the workings of photonic applications in common devices like lasers and photodetectors. It offers worked examples of measurement and characterization problems faced in everyday encounters with commercial photonic equipment; hands-on Photonics; all experiments can be done with commonly available devices; experiments enable solid engineering judgment; develop real-world problem-solving skills; Math for device analysis; not theory; get characterization basics that apply to all photonics; and analyze, characterize, and handle any kind of photonic device using the fundamental measurement techniques in this book.

From the Back Cover  
SHEDDING LIGHT ON THE SUBJECT This unique new book teaches photonics-- electronic devices that manage light and electricity-- through hands-on measurement techniques common to all photonic devices. Learn these techniques and you can characterize and understand any device and master the field. Lasers, Photodiodes, LEDs, and Photoconductors This practice-based tutorial, perfect for students and engineers looking for practical expertise rather than abstract theory, does more than explain the workings of photonic applications in common devices like lasers and photodetectors. It offers worked examples of measurement and characterization problems faced in everyday encounters with commercial photonic equipment. HANDS-ON PHOTONICS \* All experiments can be done

with commonly available devices \* Experiments enable solid engineering judgment \* Develop real-world problem-solving skills \* Math for device analysis, not theory \* Get characterization basics that apply to all photonics Analyze, characterize, and handle any kind of photonic device using the fundamental measurement techniques in this book.

About the Author Thomas P. Pearsall has contributed to the development of materials and devices for optical fiber telecommunications since 1973, leading the research and development of photonic technology at Bell Labs, Corning, and Thales. This textbook was developed while he was Professor of electrical engineering, materials science, and physics at the University of Washington in Seattle, where he held the Boeing-Johnson Chair. Fellow of both the IEEE and the American Physical Society, he is Associate Editor of IEEE Photonics Technology Letters, and an IEEE Distinguished Lecturer. He is the recipient of numerous honors, including the ATT Exceptional Achievement Award. He holds or co-holds more than a dozen U.S. patents, and has contributed to many scientific journals. He is the author/editor of Quantum Structured Semiconductors (Kluwer Academic Press, 2000), Structured-Layer Semiconductors and Semimetals (Academic Press, 1990), and GaInAsP Semiconductors (Wiley, 1982).