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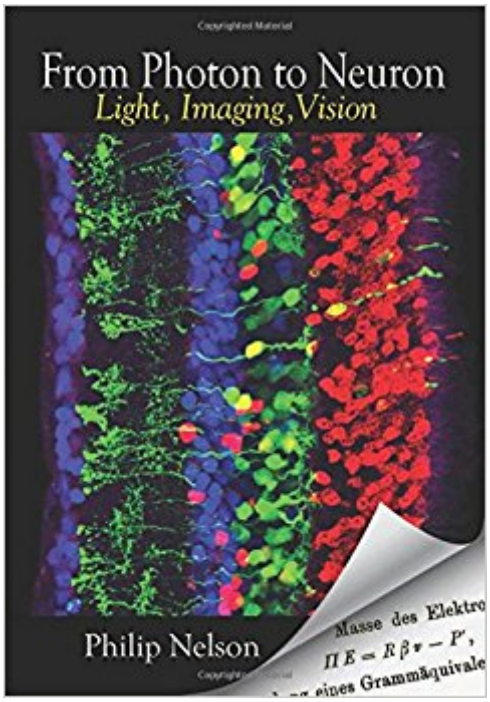
From Photon To Neuron: Light, Imaging, Vision



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Synopsis

A richly illustrated undergraduate textbook on the physics and biology of lightStudents in the physical and life sciences, and in engineering, need to know about the physics and biology of light. Recently, it has become increasingly clear that an understanding of the quantum nature of light is essential, both for the latest imaging technologies and to advance our knowledge of fundamental life processes, such as photosynthesis and human vision. From Photon to Neuron provides undergraduates with an accessible introduction to the physics of light and offers a unified view of a broad range of optical and biological phenomena. Along the way, this richly illustrated textbook builds the necessary background in neuroscience, photochemistry, and other disciplines, with applications to optogenetics, superresolution microscopy, the single-photon response of individual photoreceptor cells, and more.With its integrated approach, From Photon to Neuron can be used as the basis for interdisciplinary courses in physics, biophysics, sensory neuroscience, biophotonics, bioengineering, or nanotechnology. The goal is always for students to gain the fluency needed to derive every result for themselves, so the book includes a wealth of exercises, including many that guide students to create computer-based solutions. Supplementary online materials include real experimental data to use with the exercises.Assumes familiarity with first-year undergraduate physics and the corresponding mathOverlaps the goals of the MCAT, which now includes data-based and statistical reasoningAdvanced chapters and sections also make the book suitable for graduate coursesAn Instructor’s Guide and illustration package is available to professors

Book Information

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"Intriguing, useful, and interdisciplinary. Nelson’s excellent book provides students with a comprehensive introduction to the interaction between light and biosystems."--Zhong-Can Ou-Yang, Institute of Theoretical Physics, Chinese Academy of Sciences"The science of light and vision transcends the artificial boundaries between physics, chemistry, and biology. Isaac Newton appreciated this. Phil Nelson does, too. Nelson masterfully blends the natural sciences to explore how we perceive and control light."--Adam Cohen, Harvard University"This unusual book covers a huge variety of topics on light and vision, from fundamental physics to human visual psychophysics to some of the latest optical-microscopy techniques. Students and researchers alike in the physical and life sciences will find the book fascinating."--King-Wai Yau, Johns Hopkins University School of Medicine"Nelson has taken a subject usually treated in depth only at the graduate level and developed an understandable and coherent treatment appropriate for undergraduates. He provides a unified framework with which to discuss the disparate ways biological systems interact with light and the variety of ways researchers use light as a biological probe. There is no serious competitor for this book."--Alex J. Levine, University of California, Los Angeles"Engaging and unique. This is an excellent and well-developed textbook on the physics of light as it is processed by biological organisms and on how light can be used to interrogate biological material. From Photon to Neuron is poised to become a standard text for both physicists and biologists."--Stephanie Palmer, University of Chicago

Philip Nelson is professor of physics at the University of Pennsylvania. He is the author of Biological Physics and Physical Models of Living Systems, and coauthor of A Student’s Guide to Python for Physical Modeling (Princeton). Among other honors, he has received the Biophysical Society’s Emily M. Gray Award for educational excellence.

I find it very interesting to read, and I particularly like the figures included in the book. I also think the book is a wonderful resource for the physics students who are interested in biology. This book is another major contribution to physics education!

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