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Light, Imaging, Vision: An interdisciplinary undergraduate course[1] PHILIP NELSON, Univ of Pennsylvania — Students in physical and life science, and in engineering, need to know about the physics and biology of light. In the 21st century, it has become increasingly clear that the quantum nature of light is essential both for the latest imaging modalities and even to advance our knowledge of fundamental processes, such as photosynthesis and human vision. But many optics courses remain rooted in classical physics, with photons as an afterthought. I'll describe a new undergraduate course, for students in several science and engineering majors, that takes students from the rudiments of probability theory to modern methods like fluorescence imaging and Frster resonance energy transfer. After a digression into color vision, students then see how the Feynman principle explains the apparently wavelike phenomena associated to light, including applications like diffraction limit, subdiffraction imaging, total internal reflection and TIRF microscopy. Then we see how scientists documented the single-quantum sensitivity of the eye seven decades earlier than 'ought' to have been possible, and finally close with the remarkable signaling cascade that delivers such outstanding performance. A new textbook embodying this course will be published by Princeton University Press in Spring 2017.

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Phil Nelson
Univ of Pennsylvania

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