

## Image Science in Medicine

### Matthew Kupinski, PhD

Professor, College of Optical Sciences  
Department of Medical Imaging  
The University of Arizona



## Abstract

Image science is a growing field of study that attempts to understand every aspect of the imaging chain from the physical principles governing the interactions between light and matter to the evaluation of images by physicians, scientists, or algorithms. Taking this broad viewpoint ensures that no link in the imaging chain is ignored when attempting to design imaging hardware or make optimal use of measurements in post-processing. Traditional measures of image quality tend to analyze only a single aspect of the imaging chain. An evaluation of the entire imaging chain is possible by considering the scientific task or tasks that are performed using the images. Thus, to objectively define image quality, we consider the task to be performed, the image-formation process, the objects being imaged, and the observer (whether human or computer) performing the post-processing. In this talk, I will introduce the basic concepts of image science and show how they can be utilized in applications ranging from dose reduction in computed tomography (CT), adaptive pre-clinical imaging, and photon processing in PET and SPECT imaging.

## Biography

Matthew A. Kupinski is a Professor at The University of Arizona with appointments in the College of Optical Sciences, and the Department of Medical Imaging. He received a BS degree in physics from Trinity University in San Antonio, Texas, and received his PhD from the University of Chicago. He is the recipient of the 2007 Mark Tetalman Award given out by the Society of Nuclear Medicine and the 2012 recipient of the Graduate and Professional Student Council Outstanding Mentor Award. He is an Associate Editor of the Journal of Medical Imaging and has previously chaired the SPIE Image Perception Conference and the IEEE Medical Imaging Conference. His current and past research funding spans the NIH, corporate projects on Medical Imaging from Canon and GE, small-company projects on biometrics, and Department of Energy. He has worked in diverse areas of imaging including x-ray, gamma-ray, diffuse optical, magnetic resonance, and neutron imaging.