High-dynamic range (HDR) imaging records and displays more information than conventional imaging. Nonuniform illumination increases the range of light from a scene. Although HDR techniques are often associated with recording Natural Images (Ansel Adams), it can be used to improve medical imaging, such as endoscopy. After a detailed description of the dynamic range problem in image acquisition, this course focuses on standard methods of creating and manipulating HDR images, replacing myths with measurements of scenes, camera images, and visual appearances. The course presents measurements about the limits of accurate camera acquisition (range and color) and the usable range of light for displays presented to human vision. It discusses the principles of tone rendering and the role of HDR spatial comparison. This year, the course will review HDR in medical imaging.

Benefits:
Attendees will be able to:
• Explore the history of HDR imaging
• Understand dynamic range and quantization: the ‘salame’ metaphor
• Compare single and multiple-exposures for scene capture
• Measuring optical limits in acquisition and visualization
• Discover relationship between HDR range and scene dependency; the effect of glare
• Discuss the limits of RAW scene capture in LDR and normal scenes
• Learn about scene dependent glare in RAW image capture
• Explore the limits of our vision system on HDR
• Calculate retinal luminance
• Identify tone-rendering problems and spatial methods
• Identify the applications of HDR in medical imaging

Intended Audience:
Students, color scientists, imaging researchers, medical imagers, software and hardware engineers, photographers, cinematographers, and production specialists, interested in using HDR in imaging applications.

Biography
Prof. Alessandro Rizzi
Since 1990 he has studied the field of digital imaging and vision. His main research topic is the use of color information in digital images with particular attention to color perception mechanisms. He is Associate professor at the Dept. of Information science and Communication at University of Milano teaching Fundamentals of Digital Imaging, Multimedia Video and Human-Computer Interaction.He is one of the founders of the Italian Color Group and member of several program committees of conferences related to color and digital imaging.

John McCann
He received a degree in Biology from Harvard College in 1964. He worked in, and managed, the Vision Research Laboratory at Polaroid from 1961 to 1996. He has studied human color vision, digital image processing, large format instant photography, and the reproduction of fine art. His publications and patents have studied Retinex theory, color constancy, color from rod/cone interactions at low light levels, appearance with scattered light, and HDR imaging. He is a Fellow of the IS&T and the Optical Society of America (OSA). He is a past President of IS&T and the Artists Foundation, Boston. He is the IS&T/OSA 2002 Edwin H. Land Medalist, and IS&T 2005 Honorary Member.