

Color Reproduction

Undergraduate 3 credit course in Polymer Engineering curriculum

Amirkabir University of Technology

Chapter 1: The basics of colorimetry and radiometry (an overview on the concepts of light, light sources, color vision, colorimetry calculations).

Chapter 2: Color reproduction systems (the concept of color imaging and color reproduction, why color distortions that arise during the process of reproduction are unavoidable and why digital color devices need color reproduction, how it helps to have exact or preferred colors).

Chapter 3: Introducing digital images (digital images, RGB color space, producing color images, gray scale images, and binary images).

Chapter 4: Basics of image processing (reading images, producing and working on images, introduction of image enhancement, noise removal, image's histogram, histogram equalization).

Chapter 5: Color Gamuts (the color gamuts of imaging devices, color gamut mapping, compression gamut mapping, clipping gamut mapping).

Chapter 6: Color reproduction of display (how a display works, how it produces colors, white point characterization, Gain Offset Gamma (GOG) correction).

Chapter 7: Color reproduction of digital cameras (how a digital camera works, how it produces colors, basic of camera linearization, impact of using different light sources and filters, colorimetric characterization of a digital camera, eye-camera metamerism).

Chapter 8: Color reproduction of digital scanners (how a digital scanner works, basic of scanner linearization, the principles of color reproduction of digital scanners, influence of color space on the characterization performance).

Chapter 8: Color reproduction of digital printers (how digital printers work, halftoning process, printer resolution, gray component replacement (GCR), optical dot gain, physical dot gain, Murray-Davies model, Neugebauer Model, digital printer color characterization).

Chapter 9: Quality assessment of color reproduction devices (color image difference, S-CIELAB image quality metric).

References:

1. R. W. G. Hunt, The Reproduction of Colour, 6th ed, Wiley, 2004.
2. H-Ch Lee, Introduction to Color Imaging Science, Cambridge University Press, 2005.
3. G. Sharma, Digital Color Imaging hand book, CRC Press LLC, 2003.
4. P. Green, L. MacDonald, Colour Engineering, Wiley, 2002.
5. L.W. MacDonald, M.R. Luo, Colour Imaging: Vision and Technology, Wiley, 1999.