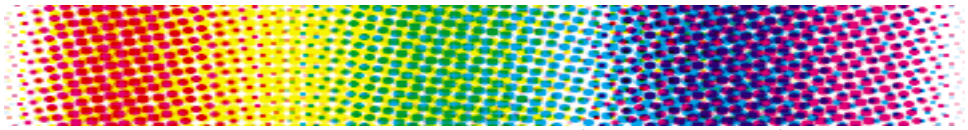


PHYSICS 410/510 (4 CREDITS)

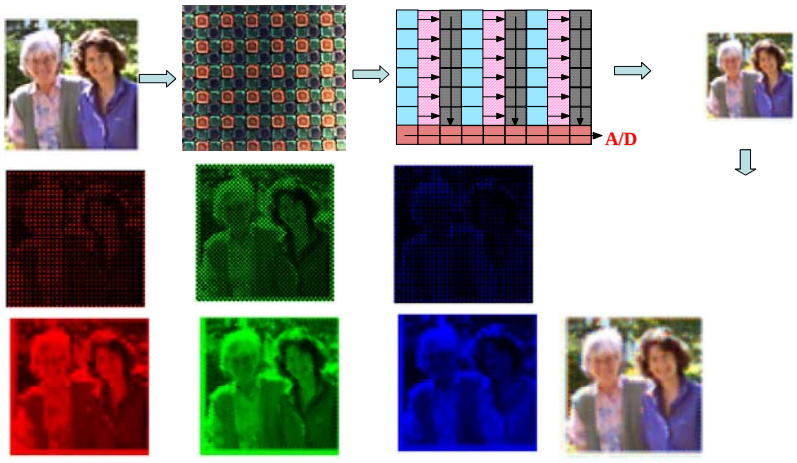
Inside Digital Photography: Technology and Application

Dates: June 25-July 19 Room: BHB 218 Time: 11:45 – 14:05

Instructor: Dr. Michael Kriss email: makriss@comcast.net

Digital Photography has all but replaced silver halide based photography. Learn how your digital camera works and explore the many technologies that are integrated to make it a reality. Learn how to modify/improve your digital images.

This course is designed to explore the technical nature and applications of digital photography. The course is designed to be essentially non-mathematical where the general principals are explained and then demonstrated by means of analytical models, simulations, and actual examples using digital cameras (those of the instructors and the students). The Digital Photographic Chain (from lens to sensor to processing to storage to print) is discussed in detail. The technologies supporting digital cameras are covered including "digital photographic optics", imaging sensor types, equivalent photographic speed, resolution (sharpness), noise and overall system quality. A significant amount of image processing is done in-camera as well as on a host computer (by means of Photoshop or other software) to form the final image (for printing or placing on the web). The basic issues of in-camera image compression and enhancement are covered as well as advanced out-of-camera image processing. Color reproduction in digital cameras is subject to artifacts due to the use of Color Filter Arrays, which encode the color information on a single imaging sensor as well as the nature of the ambient illumination (white balance). Interpolation algorithms are used produce a "continuous" final image, but one that might have significant artifacts; how to characterize these artifacts and how to minimize them is covered. Many digital images will be printed, while many more will stay stored on servers for viewing via the Web. Those printed will be made by either continuous tone printers (photographic or dye sublimation printers) or halftone printers (inkjet, "crayon" or laser printers). The nature of these printers are discussed with a focus on modern digital halftones.



Follow the Digital Photographic Imaging Chain from capture by the lens and sensor, color encoding by a Color Filter Array, transforming the analog image to a digital image, which is a sub-sampled R-G-B image, interpolating the sub-sampled image into a full R-G-B digital image, compressing and storing the image. The decompressed image is then printed for viewing using various halftone techniques by ink jet or xerographic printers.