Welcome to Computer Science E-7: Exposing Digital Photography! This is a course offered in Spring, 2008 at Harvard University's Extension School.

The course strives to offer students a more thorough understanding of digital photography through an exploration of technical, rather than strictly artistic, details. With a better understanding of the limitations and compromises behind digital photography, students will be better prepared for unexpected and dynamic photographic situations.

Find the syllabus and much more on the menu at the left!
Digital Cameras

Dynamic Range

1/80s, ISO 400, f/10

Photo by Dan Armendariz, 2006
Digital Cameras

Dynamic Range

Photons (Light)

Pixel (“Bucket”)

Collected Light
Digital Cameras

Sensor Sizes

Sensor Sizes

Size of the pixels in each?

1/2.5” 6 MP

APS-C (SLR-sized) 6 MP
Sensor Sizes

Focal Length and Perspective

Images from http://www.dpreview.com/learn/?/Glossary/Optical/Perspective_01.htm

1. 33mm. 2. Crop of #1. 3. 80mm from same distance. 4. 33mm & closer
Sensor Sizes

Focal Length and Perspective

Sensor Sizes

Focal Length and Perspective

Sensor Sizes

Focal Length and Perspective

1/2.5”
0.5 MP

APS-C (SLR-sized)
6 MP

Sensor Sizes

Same size pixels.. still dark?
Sensor Sizes

Depth of Field

Image from http://www.clarkvision.com/photoinfo/dof_myth/
Sensor Sizes

Pixel Size
Dynamic Range = $\frac{\text{Biggest Signal (full “bucket”)}}{\text{Smallest detectable signal}}$
Dynamic Range

100

200

400

800

Full capacity of pixels at ISOs
Passive Pixel Sensors
  ↓
   CCD

Active Pixel Sensors
  ↓
   CMOS
       ↓
      JFET LBCAST

Digital Cameras  Sensors