

## Technically a Good Picture Requires

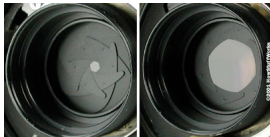
- Proper Exposure
  - You can see the details you should see
- Proper Focus
  - Nothing is blurred that shouldn't be

## Exposure

- **Amount of light striking the imaging sensor**
- A combination of
  - Intensity of light (Aperture)
  - Duration of light (Shutter Speed)
  - Sensitivity of imaging sensor/computer program (ISO)
- **“Auto” exposure** = about 18-20% average brightness. Produces a pretty good tonal range.
- **Best exposure** shows detail in the image where the photographer wants to show detail.
  - It might be much darker or lighter overall.

## Aperture

- The size of the hole letting light through the lens. Usually controlled by an iris mechanism.



## Shutter Speed

- How long the aperture hole is open
- Less than 1/30 sec requires a very steady camera. (Image stabilizer helps)
- 1/60 sec, raindrops are 3/4” long
- 1/500 sec stops most action
- Typical cameras have a range from 30+ seconds to 1/1000 sec

## Proper Exposure Involves

- Fast enough shutter to stop movement, overcome jiggle
- Slow enough shutter to allow just enough light in
- Big enough aperture for 20% average pixel brightness level
- Small enough aperture for adequate depth-of-field (all the things you want to be in focus to be so)

## ISO

- Formerly the sensitivity of the film:
  - 50 slow, needs lots of light; 400 fast
- Now relates to the software algorithm used to analyze the CCD output.
  - ISO 50 usually means ideal light for CCD range
  - ISO 400 or more means you will see some noise (speckling or “artifacts”)
  - Typical ranges 50, 100, 200, 400, and sometimes higher

## Getting Exposure Right

- Getting an acceptable tonal range Lots of information captured in shadows, mids and highlights. (“dynamic range” “luminosity range”)
- Using the automatic options
- When to under- or over- expose?
- Using adjustable exposure windows (center, corners, top, bottom)
- Lens filters can improve focus, eliminate glare, enhance contrast

## Digital Camera Differentiating Qualities

- Lens quality
  - sharpness, color correction, constant aperture
- Optical zoom range
- Aperture limit
  - F 2.0 is good for low light      F2.8 not as good
- Battery life with LCD on
- Ruggedness
- Options in the built-in software
- Pixel count
  - Only 2-Mpx makes a convincing standard print

## Digital Picture + + +

- Correct, modify the images as you please
- Store them forever without risk of scratching or fading
  - CDs have an expected shelf life of 30 years or so
- One generation closer to original compared to scanning a film-based photograph

## Picture Content

- Featuring the subject
  - Lack of distractions, flattering lighting, filling the frame
  - Something interesting for the eye to find
- Composition
  - Arrangement or “layout”
- Quality of light
  - Direction, hard or soft, morning or midday, color temperature, grayness, use of fill-in lighting, etc.
- Framing
  - Use of natural elements to surround, and point to image
  - Inclusion of narrative details

## Digital Camera + + +

- Take many pictures but keep only the promising ones
- Often excellent in low light *without flash*
- Can do color correction while taking the picture (better data, wider density range)
- Can “stitch” together panoramas
- Can take small format movies with sound
- Most have macro capabilities
- Can show images on television set
- Can print without a computer

## Digital Camera Drawbacks

- Not easy to find *really* good lenses
- Slow reaction time
  - Slow to focus if something is moving
  - Slow to get ready to take the next picture
- Quick sequence shots may not be possible
- Some are not set for “natural color”
- Some resist giving you control

## Digital Camera Drawbacks

- Some models go through a lot of batteries.
- Printing yourself is expensive.
- Inkjet printers are good but not quite equal to good film processing.
- Computer operating systems evolve
  - Will CDs, jpg format become obsolete?
  - Will you be able to open the files in 25 years?