

05 Photography 1: Framing, cameras, lenses

Wednesday, September 2, 2020 12:45 PM

- Admin:
 - Admin
 - Cameras
 - Lenses
 - Typical lenses
 - Focal lengths
 - Focus and Lens laws
 - Aperture, depth of field

Have your camera out

Don't forget Featured Image

Add BOW for matting to initial assgnts.

- Schedule; posted. Assignments every week, sometimes two.
- Friday: Download and install Darktable for image processing. <https://www.darktable.org/>. Virtual light table for organizing your still images and darkroom for modifying them. Open source, please make a donation
- Next Weds:
 - “MiniTool MovieMaker | Easy-to-Use Free MovieMaker Software.” Accessed August 26, 2020. <https://moviemaker.minitool.com/>. Good for beginners, open source?
 - But Davinci Resolve is much more powerful, professional, but has steeper learning curve. Free for individuals.
 - Office hours: Here after class M and F, and by appointment. Quicker answers on Slack. Plus, other students may have the same questions, or know the answer.
 - Three minutes in breakout. Get to know your partners for today. Talk about your BOW, IV1 or Clouds 1 progress

Overview:

Make CHOICES:

1. Flow phenomenon: Water boiling? Faucet dripping?
2. Visualization technique: Add dye? See light distorted by air/water surface?
3. Lighting (source of worst image problems). Match to vis technique.
4. Image acquisition: Still? Video? Stereo? Time lapse? High speed?
5. Post processing, final output. Edit, at least crop the image, consider contrast.

OVERVIEW Part 4: Image Acquisition.

We'll do this section in more depth than in the rest of our Overview.

Good digital photography references:

Thousands of books are out there. Do you have a preference? Do you want a book? Choose something recent; technology is changing rapidly. We'll cover basics here to get you started.

Linked In Learning

- Lynda.com: online video tutorials for photography and video production
CU has a site license: lynda.colorado.edu
Log in with identkey



4.1) Framing/Composition

- a. #1 rule of photography: **Make The Subject Fill The Frame**
Yes, you can crop to achieve this, but image dimensions of less than 700 pixels won't be accepted. Use your real estate well.
 - b. Know your scale. Take an **extra** image with a ruler in it.
You'll need to specify your FOV = Field of View
i.e. "top to bottom was 10 cm"
Sometimes the image will supply the scale, such as the diameter of a jet.
 - c. **Work it.** Take many images, from varied POV = Points of View
 - Get close, pull back. Move around the sides.
 - Try a mirror to see the back.
 - Consider making a stereo image
 - Try video, a few seconds or minutes
 - Change the lighting.
 - Try time lapse (smartphone camera app is easy to use)
 - Consider the motion: Capture the whole track, and also zoom in on a particular moment/location
- Plan lots of attempts. **Look at results at full resolution first**, not just on camera LCD. Takes time.



4.2) Cameras: Roughly 4 common types, but technology is changing quickly

All have

- AE = Auto Exposure. Automatically sets shutter time, aperture, ISO (sensor sensitivity) according to varied programs
- AF = Auto Focus. May be contrast focus and/or phase detection technology. See <https://www.impeltier.com/2017/12/08/difference-phase-detection-contrast-detection-autofocus/>

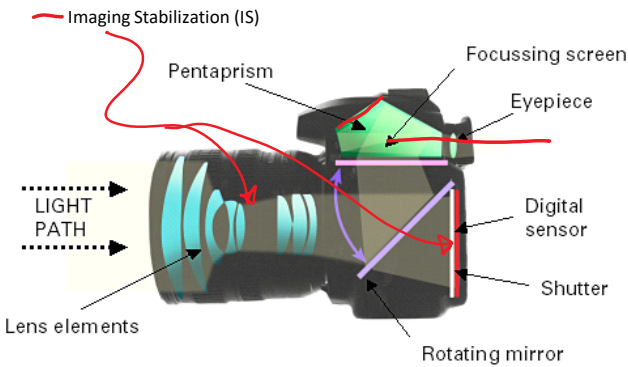
Who has what?

| | | | | |
|---|---|---|-----------|------------------------|
| DSLR A | Mirrorless S | Point and Shoot C | Film D | Phone camera only L |
| Digital Single Lens Reflex Optical viewfinder 54% | Interchangeable lens but no viewfinder, just LCD 21% | PHD Push Here Dummy. LCD viewer, fixed lens 14% | 4% | 7% |

DSLR

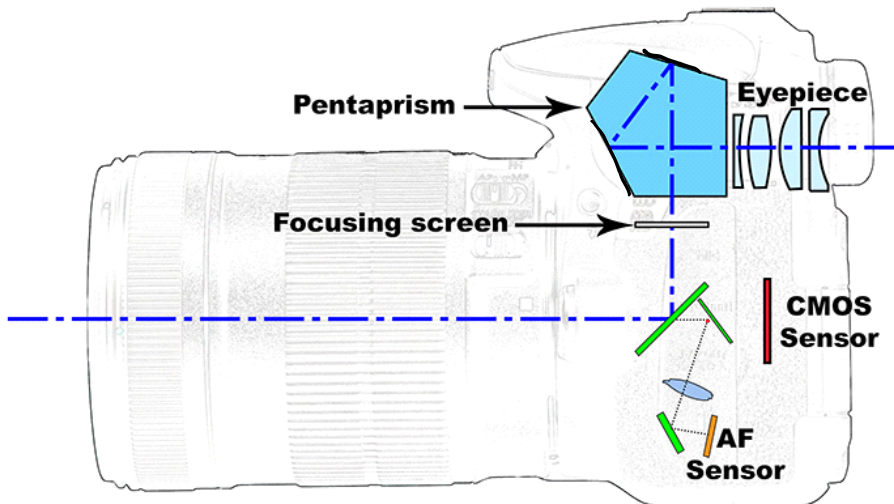


https://www.ephotozine.com/articles/nikon-d5-dslr-hands-on-preview-28654/images/highres-Nikon-D5-Internals-Cross-Section-1_1452055157.jpg



<https://george12johnson12.files.wordpress.com/2015/03/slr02.jpg>

Mirror flips up when shutter triggers = REFLEX.
For long exposures, lock mirror up to prevent vibration.



<https://2dhnizrxqvv1awj231eodql1-wpengine.netdna-ssl.com/wp-content/uploads/2017/03/AFSensor.jpg>

Use circular polarizers on lens front to get past partial mirrors into AF and AE sensors. Why use a polarizer? Darker skies, no glare, keeps colors for the most part.

However, Ansel Adams used yellow or red filter to get beautiful black skies in B/W:



<https://www.moma.org/collection/works/58296>

https://en.wikipedia.org/wiki/Ansel_Adams

Probably the most famous landscape photographer ever. Shaped the evolution of photography and influenced technology

Mirrorless

Same capabilities as DSLR, but no optical viewfinder; LCD display only. Lighter weight as a result. Image composition in varied lighting conditions can be difficult, harder for folks with glasses, less focus resolution. Maybe electronic shutter only?

PHD:

Small sensors; lower resolution even if mpx the same; diffraction limits approached? Often no lens choices. Can still add close-up lens. Composition is harder. LCD screens tough to use in sun, don't show fine focus (on low end cameras). Usually can't preview depth of field. Much lighter, more portable. Comparable performance at prosumer level. Often excellent macro (close up) imaging due to small sensor and short focal length lens.

Phone cameras

Very small sensors, very short focal lengths but reasonable MPx. Often good macro imaging. Can add lenses. Often dirty or damaged lens surface. Fixed aperture size, electronic shutters only. Difficult to specify exposure or focus; specialized apps may help. Unknown image processing.

CAMCORDERS:

primarily for video, now only professionals use; prosumers use DSLRs, everybody else uses phones. Records to disk or solid state memory. Usually longer record time than still cameras. Built-in effects, maybe editing, quieter mechanisms, set white balance, better microphones

Camera technology is changing rapidly. Lines between designs are shifting. Superzooms, for example.

24x.

1. LENSES

Minute paper. Compare in your groups. What are the numbers on your lens? What do they mean?

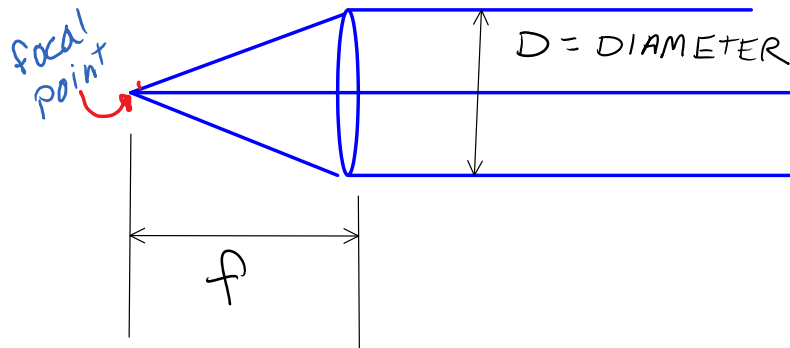
18-55 mm
 focal length
 zoom lens
 18-105

f/3.5-5.6
 aperture

∅
 67
 thread size
 ↑

Lenses are defined by FOCAL LENGTH and APERTURE and Diameter

f = focal length = distance from center of lens system to sensor when focused at infinity



\odot Symbol for center of lens
Or sensor location

\emptyset Symbol for thread diameter

Variable focal length = ZOOM lens.

Now is default. Non-zoom are called 'prime' lenses.

10 years ago, 35 mm film cameras were standard, and the standard lens was 50 mm. $f > 50$ mm = telephoto *long T*

$f < 50$ mm = wide angle *short W*

$f = 18 - 55$
= focal length range

$f \div D = 3.5 = \text{aperture} = f/\#$

$f/D = 3.5 - 5.6$

= range of maximum aperture

Aperture defined as $f/D = f/\#$ = f number = f#
INVERSELY related to diameter.

Nondimensional. More about aperture later.