Understanding ISO

ISO controls **how sensitive your camera's sensor appears to be to light**.

- **Low ISO (100–800):** Low sensitivity, clean-low noise image
- **High ISO (1000–6400+):** Strong sensitivity, brighter image, more noise

Raising ISO allows you to photograph in lower light without changing your aperture or shutter speed. The trade-off is **noise**—a speckled, grainy texture that becomes more visible as the image is enlarged. A photo that looks clean and smooth at 4×6 may show noticeable noise at 8×10 or larger.

For the best image quality, use the **lowest ISO that still gives you a correct exposure**.

When to Use Low ISO (100–800)

- Bright outdoor light
- Studio lighting
- When you want maximum detail and minimum noise

When to Use High ISO (1000–6400+)

- Indoor or low-light scenes
- Night photography
- Fast shutter speeds needed to freeze motion

ISO and the Exposure Triangle

ISO is one of the three settings that determine exposure:

- **ISO** – sensitivity to light, affects brightness and noise
- **Aperture (f-stop)** – how much light enters the lens, through a sized opening, affects Depth of Field (more on DOF in the Aperture handout)
- **Shutter Speed** – how long the sensor gathers light, how fast or slow the shutter opens and closes, affects motion

All three work together to create the final exposure and the overall look of your image.

How ISO Works in Digital Sensors

Digital sensors don't change their physical sensitivity when you adjust ISO. Instead, the camera changes the **amplification of the electrical signal** created by the light hitting each pixel.

Key points:

- Each pixel contains a **photodiode** that collects photons.
- **Larger pixels** collect more photons, which improves low-light performance, dynamic range, and reduces noise.
- **Smaller pixels** collect fewer photons, which can increase noise, especially at higher ISOs.
- Changing ISO on your camera **does not** change the sensor's physical sensitivity—it changes how much the signal is boosted.

Because of this, higher ISO settings increase brightness but also increase noise, especially in the shadows.

Native ISO

Every digital camera has a **native ISO**—the ISO setting where the sensor performs at its best. At this setting, the camera delivers:

- Maximum dynamic range
- Lowest noise
- Best color accuracy
- Cleanest shadows

But real-world image quality depends on many factors—sensor size, pixel design, processing, and more. Specs only tell part of the story; the images themselves tell the rest.

Common Native ISOs

- **Canon:** Usually ISO 100
- **Nikon:** Often ISO 64 or ISO 100 depending on model
- **Sony:** Often ISO 100, some models ISO 80 or ISO 64
- **Fujifilm:** Often ISO 160 on X-Trans sensors

Lighting, Exposure and Real-World Compromises

As you review your images, keep in mind that **lighting conditions will always influence your ISO choices**.

In **good light** (sunny days, really bright indoor lighting), you have the flexibility to choose the **lowest ISO** that gives you the exposure and shutter speed you want. This allows you to maintain clean image quality while still controlling the movement of your subject.

In **low-light situations** (heavy clouds or shade, before sunrise or after sunset, indoor conditions, however, you'll often need to **raise the ISO** to get a correct exposure and maintain a shutter speed that prevents motion blur. This means accepting more noise in the image, but it also ensures you capture a usable photograph with the motion control you need. Every photographer makes these trade-offs—your goal is to understand how your camera behaves so you can make confident decisions in any lighting scenario.

Reducing Noise in Post-Processing

As you evaluate your ISO test images, remember that **noise can also be managed later in post-processing**. Most editing programs—such as Lightroom, Adobe Camera Raw, Capture One, and others—include noise-reduction tools that help smooth grain, recover detail, and improve overall image quality. These tools can make higher-ISO images more usable, especially in low-light situations where raising ISO is unavoidable.

Noise reduction does have limits, and applying too much can soften fine detail, so learning how to balance it is an important skill.

A separate learning guide will cover how to control noise effectively in post-processing and how to make the most of your camera's high-ISO files.

ISO Exercise

This exercise helps you see **how ISO affects brightness and noise in your own camera**.

Instructions

- Set your camera to **Manual Exposure mode**. **M** in the mode setting
- Alternatively, you can use **Aperture Priority mode** - **A** or **AV** (on Canon).
- Shoot **outdoors in daylight** for consistent lighting. The light/sun should be behind you (and the camera), and not behind the subject.
- The subject or scene doesn't matter a lot, we are only looking at these to compare how ISO affects the overall image, and where your camera starts to show more to a lot of noise. The subject should **not** be: a solid wall, a very detailed or textured scene. It can be a view of the exterior of where you live, an interesting object – but not a close-up. Do not photograph people or animals or moving objects for this, you want something that is consistent so you can easily compare the results.
- You can use **auto focus** or **manual focus** just be sure the focus is always on the same object in each image frame.
- Use the **highest-quality JPEG** your camera offers, usually **L** in the file format settings.
- Set the **White Balance** - **WB** to auto.
- Choose **one subject** and keep the framing identical for every image.
- Photograph the subject at **ISO 100, 200, 400, 800, 1600, 2000, 3200, 6400**. If you are in very bright sunlight, the higher ISO may not be possible.
- Use your in-camera **light meter** to adjust shutter speed and/or aperture for correct exposure at each ISO. You want the in-camera meter to be set in the 0 (center) position, if it fluctuates a notch above or below, that is fine.
- Recommended starting exposure settings:
    - Shutter Speed should be at 1/100 to start, in **Manual mode** - you will change it to a higher number every time you change the ISO
    - F-stop should be around F16 for a sunny day, F8 for a cloudy day or shady location. Keep the F-stop the same and only change the shutter speed for this exercise.

    - If you are using **Aperture Priority mode**, as you change the ISO, the shutter speed will also change to faster (higher number)
- Ensure **something in the frame is sharply in focus**—no blur or camera shake.
- Capture **8 images total**. Do not delete as you go.

Self-Review: Evaluating Your ISO Test Images

Once you've completed your ISO series, take time to review the images carefully. This step helps you see how ISO affects brightness, detail, and noise in real-world shooting.

1. Download Your Images

Save all of your ISO test files to your computer or laptop. Keep them in one folder so you can easily compare them.

2. View the Images in Order

Open the images in succession—ISO 100 through ISO 3200—using your preferred photo viewer or editing software.
Look for changes in:

- Overall brightness
- Contrast
- Color shifts
- Detail and clarity

3. Compare Them Side by Side

Most viewing programs allow you to place two or more images next to each other.
Compare: (you can see the ISO in the camera's metadata EXIF info that is embedded in each image file)

- ISO 100 vs. ISO 400
- ISO 400 vs. ISO 800
- ISO 800 vs. ISO 1600
- ISO 1600 vs. ISO 3200
- ISO 100 vs. ISO 800
- ISO 400 vs. ISO 1600
- ISO 800 vs. ISO 3200

This helps you see how noise gradually increases as ISO rises, and where you have an acceptable noise level.

4. Zoom In for a Closer Look

After reviewing the full-frame images, zoom in to **100% (1:1)**.
At this magnification, evaluate:

- Noise or grain in shadows and midtones
- Loss of fine detail
- Texture changes in smooth areas (sky, walls, skin, etc.)
- Edge sharpness

Zooming in reveals what you might not notice at smaller print sizes.

5. Reflect on What You See

Ask yourself:

- At which ISO does noise first become noticeable?
- At which ISO does it become distracting?
- How does your camera handle high ISO compared to what you expected?
- What ISO range would you feel comfortable using for future assignments?

6. Take Notes

Write down your observations. These notes will help you understand your camera's strengths and limitations—and guide your exposure choices in future projects.

