

# Nikon School

Educate + Inspire

## BASICS OF EXPOSURE AND CAMERA CONTROLS

These notes are written to complement the material presented in the Nikon School of Photography “Basics of Exposure and Camera Controls” class.

Helpful websites:

[Nikon USA](#)

[Nikon Learn and Explore](#)

[Videos explaining the features of Nikon cameras](#)

[Manuals for Nikon products](#)

### Goals for the Day

To make good pictures on a consistent basis and truly unlock your creative potential, you need to understand both the basics of exposure and how to control your camera. There are two essential things we want you to come away with:

- 1 – An understanding of how exposure works and how exposure variables relate to each other and have a creative impact on your photos.
- 2 – The knowledge to start taking control of your pictures by understanding how to control the camera.

At the same time, it’s important to know that many of the choices you make will be personal. Based on what you like to shoot, how you shoot and what you want to do with your photos. Of course what’s most important is that you enjoy taking pictures. Remember, there are no secrets – just a better understanding of the tools and techniques available to all, and that practice makes perfect.

Our seminar will cover these two topics, and be broken down into two sections:

- 1 – **Exposure**
- 2 – **Using my Camera**



## Section 1 - Exposure

Without light there are no pictures. The less light you have, the harder it is to get good pictures. If you want to make better pictures, then you need to understand the basics of exposure. We'll break it down into four areas:

### The Four Components of Exposure

#### 1 - Meter

#### 2 - ISO

#### 3 - Shutter Speed

#### 4 - Aperture

#### 1 - Meter

The meter is the brain of exposure, calculating how much light is needed to get a proper exposure. More simply, it's a tool to measure light. Without the meter you'd just be guessing at exposure. Today's cameras have built-in meters for making that calculation. Most Nikon cameras offer three metering modes: Matrix, Center-weighted and Spot. The default is Matrix, the most advanced, and that's a good place to be for most common photographic situations.

#### 2 - ISO

The meter needs some information to start with, and that's referred to as ISO. ISO tells the meter how much light is needed for a proper exposure. You can think of ISO as a sensitivity setting. The less light you have, the higher the ISO you'll probably need. ISO is the first of three variables with exposure, and is adjustable.

#### 3 - Shutter Speed

There are only two controls for letting light into the camera, and the shutter is one. "Shutter speed" simply means how long the shutter is open. Short shutter speeds let less light in; longer ones let more light in.

#### 4 - Aperture

The second control for letting light into the camera is the aperture, the aperture blades open to allow light through the lens. This diaphragm is adjustable, allowing the photographer to choose a larger or smaller opening to let more or less light in.



---

---

---

---

---

---

---

---

---

---

**Exposure**

Exposure is the result of the meter measuring how much light is in the scene, referring to the ISO that the camera is using, and then determining how much light needs to be gathered using shutter speed and aperture to get a good exposure.

**Shutter Speed**

Faster (higher) shutter speeds let in less light – they're open a shorter amount of time. Slower (lower) shutter speeds let more light in – they're open longer. Faster shutter speeds can stop action; slower shutter speeds can result in blurry pictures (intentionally or unintentionally). 1/1000 of a second is a very short shutter speed (high number), and can almost freeze the blades of a helicopter in flight. 1/30 of a second is slow, so that even a photo of a person walking would show some blur. A good baseline when shooting fast action is to try for a shutter speed around 1/500 second. At that speed most action will be stopped, or slowed enough for a fairly good picture. Of course, faster speeds will stop more action.

When you go below one second in exposure, the numbers grow, but they're in SECONDS now, not fractions of a second. If you see 10", that means ten seconds. You can tell by the " " which indicate seconds. 1/10 of a second on some cameras just shows 10. Not all cameras show the 1/. Some may show 1/1000 like this, others just as 1000.

With shutter speed, the simple rule is that fast shutter speeds can stop action (or slow it to where it looks stopped) while slow shutter speeds can result in blur.

**Blur**

“Blur” simply means any time movement has not been frozen, or stopped, during capture. And blur is one of two things (the other being focus) that commonly ruin pictures. The good news about blur is that there are only two causes for it: subject movement and camera movement.

There are four areas we'll discuss to help you avoid blur:



---

---

---

---

---

---

---

---

---

---

**1 – Shutter Speed** – as mentioned above, faster shutter speeds will stop action better than slow shutter speeds. If the subject you’re photographing is moving fast and you’re using a slow shutter speed, then the result will likely be blur. Using a faster shutter speed is thus one way to avoid blur, by stopping *subject movement*.

**2 – Technique** – If the camera is moving when the picture is taken, even of a non-moving subject (like a mountain), that can result in blur. That’s why proper technique in holding and shooting the camera is so important. Also, remember that telephoto lenses magnify both the good and the bad. So when shooting longer lenses, try to use faster shutter speeds.

**3 – Technology** – Many of today’s Nikon lenses use a type of image stabilization technology called “Vibration Reduction.” Often shortened to “VR,” it means that lens elements are able to shift to help compensate for movement of the *camera* when taking pictures. What this means is that you’re often able to shoot hand-held at slower shutter speeds, than you could without VR. How much slower depends on how steady you are to begin with, but on average up to four stops slower.

**4 – Accessories** – There are other ways to reduce the chance of camera movement as well. Tripods and monopods are great ways to help stabilize the camera while shooting.

It’s important to remember that blur is not always a bad thing. One popular technique that creates blur is to mount the camera on a tripod and use slow shutter speeds (of one second or even longer) and photograph action to create intentionally blurred images. You can make some truly unique and beautiful pictures doing this.

### Aperture

The aperture is simply the diaphragm (hole) in the lens that allows light into the camera. It’s adjustable in size so the photographer can use it to control the amount of light entering the camera. This amount of light is referred to as an “f/stop,” which is a mathematical calculation of the quantity of light that enters the camera after passing through the diaphragm (aperture) and the glass elements into the lens.

F/stop numbers can seem counterintuitive. Smaller apertures are represented by large







**Total Exposure**

At any selected ISO, a particular combination of shutter speed and aperture will produce a proper exposure. These two controls work together and can have many combinations that allow an equal quantity of light to enter the camera. If you want to allow more light in with one, and maintain the same amount of light, you have to let less light in with the other. Otherwise you'll overexpose (too much light) or underexpose (too little light), creating a lighter or darker image.

**Why change ISO?**

Raising ISO means you need less light for an exposure. So the most common reason for raising ISO is to be able to shoot at a higher shutter speed to avoid blur.

There are two primary concerns for setting ISO:

- 1 – Stay at low ISOs when you can (which means in the 100-400 ISO range)
- 2 – Raise the ISO when you have to (and that's usually to obtain a faster shutter speed).

You might ask, "why not just use a higher ISO all the time?" That would be nice, except that there's a downside to going up in ISO. While it lets you make pictures in lower light, or at faster shutter speeds, it also can result in loss of image quality. At some point as you raise ISO you'll start noticing what's called "noise," which is a grainy look to the image and slight loss of color saturation.

**Shooting Modes**

Shooting Modes can allow you the choice to be either automatic or in full control of your settings. "Exposure" modes are those that affect only exposure, giving you control over all the other settings. Let's look at the shooting modes that aren't technically exposure modes.

*Auto Exposure* (green "Auto" symbol) is a shooting mode where the camera makes all decisions about exposure. It chooses ISO, shutter speed and aperture to try to give you a good exposure. It's basically the "point-and-shoot" option in these cameras. This mode also takes over most other camera decisions, including things like autofocus, processing settings and flash, so it controls more than just exposure.

---

---

---

---

---

---

---

---

---

---



**Scene Modes**, sometimes called Vari-Program Modes, change how the camera functions based on the type of scene you tell the camera you're shooting. Scene modes tend to change things like shutter speed, autofocus mode (and point(s) used), aperture (for depth of field), whether flash is used, the amount of sharpening in-camera and how the color of the photo is processed as well as other settings.

Some of the common Scene Modes are:

- Auto Flash Off – simply keeps the flash from popping up and firing.
- Night Portrait – sets the flash to slow-sync (allows the shutter speed to go very low) and sets the focus to the closest subject.
- Portrait – sets focus on the closest subject and opts for a wide aperture (for shallow depth of field).
- Landscape – sets focus to the closest subject (or sometimes infinity), and enhances the sharpening and color.
- Sports – sets the focus to Continuous, the frame rate to Continuous and tries for a high shutter speed.

**Guide** mode, new to some Nikon cameras, helps walk you through how to set the camera based on additional information you give the camera. It's a nice step up from Scene modes.

The other four shooting modes are called "Exposure Modes." That's because they control only exposure, not other camera settings. Those four are Program, Aperture Priority, Shutter Priority and Manual.

**Program** mode has the camera choose both the shutter speed and aperture for a proper exposure, based on the ISO you've selected. In this way, it's just like Auto. However, with Program you can shift that combination of shutter speed and aperture (called "Flexible" Program) using the Main command dial, while maintaining the same total exposure. Since Program Mode only affects exposure, you have access to the other functions of the camera through the menus.

Before we get into the other exposure modes, it's important to distinguish between different Nikon camera bodies, because the controls you use may be different based on body style.

---

---

---

---

---

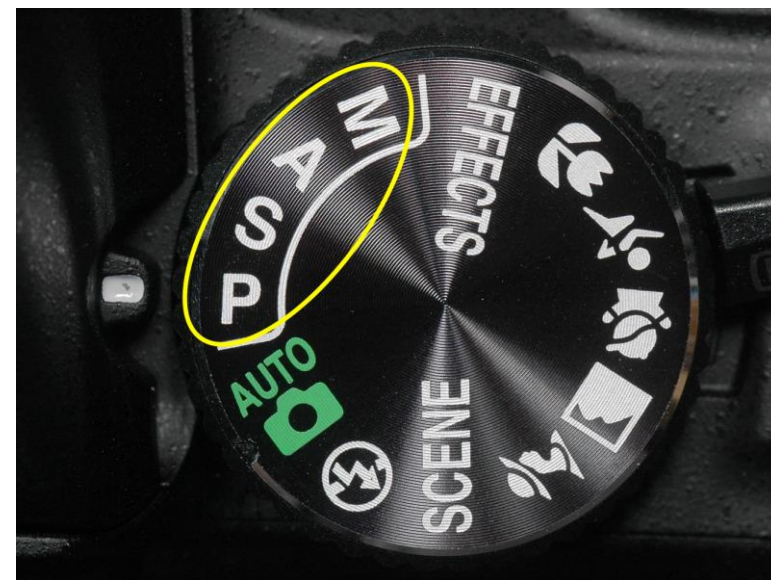
---

---

---

---

---



Entry Level – These cameras have one Main command dial, and current models are the D3300, D5300 and D5500 cameras.

Enthusiast – These cameras have a Main Command dial, but also a Sub-command dial in front of the shutter button, as well as more buttons.

Professional – These are the top-of-the line cameras, with a Main and Sub-command dials and even more buttons for quickly changing various settings.

**Shutter Priority** lets the photographer choose the shutter speed to be used, and then the camera automatically selects an appropriate aperture for a proper exposure. This lets you choose a high shutter speed to stop action or a low shutter speed for blur. But there are limits. It's possible to set the shutter speed too high or low for the aperture range the lens has, resulting in under or over-exposed photos. You may see "Lo" or "Hi" blinking in the viewfinder if that's happening, or one of the numbers will blink to warn you there's an exposure problem.

**Aperture Priority** lets the user select the f/stop, and then the camera matches up a shutter speed to achieve a proper exposure. It lets you choose how much or little depth of field you want, but you have to keep an eye on the shutter speed it selects. Too slow and you will get blurry photos. It too will indicate if there's an exposure problem (just like Shutter Priority, above, does), but there's less chance of that since the range of shutter speeds available is much greater.

Whichever exposure mode you choose to use, it's important to realize that Program, Shutter Priority and Aperture Priority can all get you to the same place as far as exposure. The real difference between the three is how you interact with the camera.

**Manual** means that you, the photographer, are taking complete control over all the exposure variables. The camera won't set anything, although the built-in meter will help guide you to a proper exposure. It's the most difficult mode to master, and one we won't focus on in this class.

### **Exposure Compensation (+/- EV)**

Almost all cameras will let you override automatic exposure. This is called "exposure compensation" (sometimes referred to as "+/- EV") and is a simple way for you to take more control over exposure when shooting in an Automatic Exposure Mode (Program,



---

---

---

---

---





## Flash

Many of today's cameras have a built-in flash, which makes it easy to add light to photos. The problem is that most people don't understand when (or how) to turn them off. In full automatic mode, the camera will pop the flash up and fire it any time it thinks there isn't enough light. The question you have to ask yourself is, "Do I need flash to get this photo, or will it ruin what I'm trying to capture?" Start experimenting by trying the same pictures with the flash on and off. Remember, if you're in the Automatic shooting mode, the camera will fire the flash as needed. If you don't want the flash to fire, you can turn it off by switching to the lightning bolt icon with a line through it on the mode dial. This mode is Auto without flash. You can also switch to Program, Shutter, Aperture or Manual mode, whereby the flash will ONLY fire if you pop it up yourself. You can do that by pressing the small button on the side of the viewfinder that has a lightning bolt icon on it. Note: control over the flash in Auto and Scene modes can be obtained by pressing the lightning bolt button (on the side of the viewfinder), holding it in and rotating the main command dial. The flash icon on the top control panel or back LCD will cycle through the different flash options, choose the lightning bolt with a line through it. This will turn the flash off for the desired mode until the camera is turned off. At that point the camera will return to the flash defaults for Auto and the Scene modes.

The big advantage to having an accessory flash (called a "Speedlight") is that it's adjustable and more powerful. It sits higher on the camera, which means less chance of red-eye. You can also point it at the ceiling, or a nearby wall to create "bounce" flash, to make the light softer and more natural looking. Because it's more powerful, it's able to project light further, and recycles faster between shots.

Finally, there are sure to be times where you'd like to share what you're shooting with others, immediately. Rather than make a poor quality snap with your smartphone, try the wireless technology built into many Nikon cameras. That will allow you to quickly and easily see the photos on your camera from your smartphone (iOS and Android supported), then pull that photo to the camera (no wires needed) so it can be posted right away. And there are even inexpensive adapters – the Nikon WU-1a and Nikon WU-1b – that add that ability to some of Nikon's other cameras. Find out more [here](#).



## NIKON SCHOOL TIPS!

Here are five tips to help you take control of your pictures:

**1 – Get Closer**

**2 – Watch the Background**

**3 – Think about Framing**

**4 – Consider Unusual Angles**

**5 – Watch People**



## In Closing

As we said at the beginning, there are no secrets to good photography. All it takes is a little patience, some knowledge and practice. And that's the most important part, practice. We're glad you joined us today, and hope we were able to help you learn some things to improve your photography. The rest is up to you. Find reasons to get out and go shooting. Do that on a regular basis and your photography will improve. Most important of all, have fun!

## Other Resources

If you're looking for more ideas, or how-to's, Nikon has many excellent social media and web resources that you can use to get more information or simply fresh ideas. Some of them are:

**Facebook:** <https://www.facebook.com/nikonusa>

**Twitter:** <https://twitter.com/nikonusa>

---

---

---

---

---

---

---

---

---

---



**Instagram:** <https://instagram.com/nikonusa>

**YouTube:** <https://www.youtube.com/nikonusa>

**Google+:** <https://plus.google.com/+nikonusa>

**Flickr:** <https://www.flickr.com/groups/nikondigitallearningcenter/>

**Vimeo:** <https://vimeo.com/groups/nikonusa>

