



Module 2: **ISO**

Module overview

In this module you'll learn about the following:

- The origins of ISO
- How ISO works
- Using the correct ISO setting
- How ISO effects exposure settings
- Fixing problems created by high ISO settings
- ISO Tips



“Wherever there is light, one can photograph.”

Alfred Stieglitz
(1864 – 1946)

Tip: try shooting the same thing at different ISO settings to see how your camera's sensor handles noise.

Start at 200 ISO and then gradually move up to the highest setting. When you view the images on your computer, enlarge them to 100% and take note of when the images start to become "noisy".

This will be a good indication of how high you set your ISO.

2.1 Origins of ISO

If you do an internet search for "ISO," the first thing that usually comes up is the International Organization for Standardization (also known as ISO). This may seem like a coincidence, but the two are actually connected.

In photography terms, ISO refers to the film speed, meaning the film's sensitivity to light. The first system for measuring was invented by Polish Engineer Leon Warnerke (known as the Warnerke system). This was followed by a series of different systems, including Scheiner, General Electric, DIN and ASA.

In 1974, the International Organization for Standardization combined with DIN and ASA to create the ISO system, which has been carried forward by digital cameras even though they don't use film.

2.2 How ISO Works

When 35mm film was popular, the three most commonly used film speeds were 100, 200 and 400 ISO. The general rule of thumb was that 100 ISO was used for bright sunlight, 200 ISO was used for outdoor situations where the light wasn't so strong (indoors during the daytime or outdoors on a cloudy day) and 400 ISO was used for night time photography.

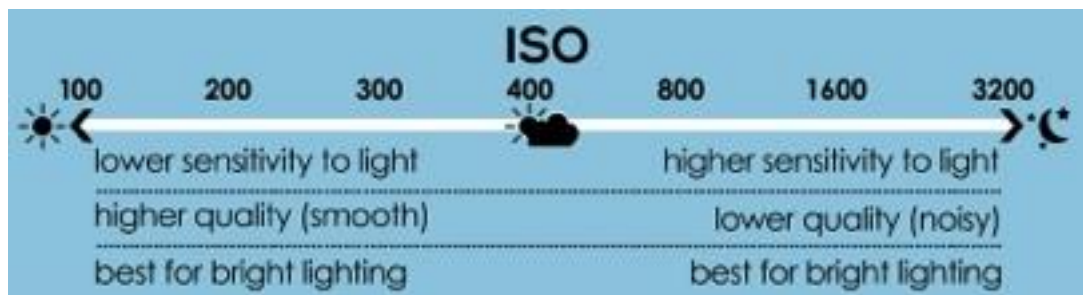
Other films were available from the ultra-slow 10 ISO to the super-fast 3200 ISO, but these were for black and white film photography. So the "speed" of the film meant how sensitive it was to light. The higher the ISO number, the "faster" the film.

DSLR manufacturers wisely decided to keep the ISO scale; but instead of the ISO setting referring to the film's sensitivity to light, it now refers to the digital sensor's sensitivity to light.



2.3 Using the Correct ISO Settings

In most cases, the best ISO setting is the lowest one. If you're shooting outdoors on a sunny day or you're in a studio with lighting equipment, then it's easy to keep the ISO settings low.



Lower ISO settings mean better-quality images. Using high ISO on film cameras creates grainy images; usually this is intended. However, on digital cameras this creates noise. So, what is "noise"?

Tip: long exposures can also cause noise, but most DSLR cameras will have a long exposure noise reduction setting.

Consulting your manual will tell you how to activate it. If you don't have the manual, then a quick internet search should find the solution.

Digital noise is a visual distortion created by low light levels; one of the main culprits for creating noise is high ISO settings.



Here's the same shot taken at 320 ISO and 3200 ISO. As you can see, at 3200 ISO the image is not as sharp, the edges are softer and there's a significant amount of digital noise.



At 100% magnification, it looks even worse; the lines are not clearly defined and, unlike film grain which can look good for certain types of photographs, digital noise rarely has any good aesthetic qualities.

However, it's important to remember that unless you're making large prints, it will be less noticeable. An image posted online or made into a small print will only be a fraction of the original size.

Tip: Adobe Photoshop is the industry standard for photo editing, but there are alternatives.

GIMP is an open source (in other words, free!) program that has many of the same features, as Photoshop; but it can be difficult to use, so some patience is required.

Pixlr is an online photo-editing tool; you either upload an image or, if the image is already online simply copy and paste the URL.



Here's the 3200 ISO image shown at 12% magnification. The noise is still visible but it's far less noticeable

2.4 How ISO Affects Exposure Settings

So far, all the talk of high ISO settings has been negative, but it does have its advantages. Your camera's sensor will be more sensitive to light, which will allow you to use faster shutter speeds, essential if you're capturing action.

Exposure setting will be discussed in greater detail in Module 5, but sometimes finding the right exposure means compromise. ISO is usually the first thing you set when shooting and it will have an effect on your shutter speed. If shooting action is the priority, then you'll have to use a high setting to avoid motion blur.

As you get to know your camera, you'll have a better idea of what your maximum ISO setting will be. This is also a matter of personal preference: some photographers despise noise and will do everything to try to minimise it, while other don't have a problem with it; and many photographers will tell you that "a noisy image is better than a blurry image", but really it depends on what you're shooting.

A tripod will steady your camera and allow you to use slightly slower shutter speeds, and external lighting and flash units will increase the amount of light; so try to do everything to keep your ISO low, but don't be afraid of using a higher setting when necessary.

2.5 Fixing Problems Caused by High ISO Settings

It's possible to reduce digital noise using software and there are many programs that can do this; but buying one piece of software to do one thing only is a waste of money. The best way to reduce noise in post-production is to shoot RAW files.

Tip: if you're shooting in low light, take a few test shots with your chosen ISO setting. Then take a look at them on your camera's view screen (remember to enlarge them to full magnification). If the shots look too noisy, try using the next setting down.

If you're not sure what a RAW file is don't worry – this will be covered in Module 8.

Basically, RAW is an uncompressed file that contains more information than a standard JPEG file. If shooting RAW files, they're much easier to edit and adjust.



Applying noise reduction filters can help. This example shows the image at 100% magnification, before and after the noise reduction. The filtered version has less noise but it lacks the sharpness of the original.



Another solution is to convert the image to black and white, this gives the impression of film grain as opposed to digital noise.

Tip: although it's important to view your photo image files at 100% magnification, especially when making any adjustments with editing software, always remember how you intend the final photograph to be viewed. If it's only being displayed online or being made into 6x4 prints, then don't obsess over any minor flaws that won't even be visible.



It's always better to shoot the image correctly in the first place, but occasionally you'll find an image that you really like but that has too much noise. You probably won't be able to get a good print from it, but it will look fine when displayed on a computer monitor.

So when it comes to setting your ISO, there are many variables to think about; but as you become more experienced, you will be able to look at any situation and estimate the correct setting. And as you get to know the capabilities (and possible limitations) of your camera, then choosing the correct setting will become second nature to you.

2.6 Summary

- The ISO setting will either increase or decrease the sensor's sensitivity to light.
- Try to keep your ISO setting as low as possible to avoid creating digital noise.
- Think about whether your images will be printed or just displayed on a computer screen. If they will be printed, then a lower ISO is recommended.
- Occasionally, you will have to use a high ISO setting.
- In most cases, a noisy image is better than a blurry one.
- Digital noise reduction software exists, but it's not always the answer as it leaves your images with an unrealistic look.

Assessment 2

- 1) Where does the name ISO come from?
- 2) What are two other film speed systems used before ISO?
- 3) Name one situation when it would be appropriate to use 100 ISO?
- 4) Name one situation when it would be appropriate to use 400 ISO?
- 5) Name one situation when it would be appropriate to use 3200 ISO?
- 6) What effect does high ISO have on film images?
- 7) What effect does high ISO have on digital images?
- 8) What are the advantages of using a high ISO setting?
- 9) How can you keep the ISO setting lower?
- 10) True or False? A JPEG file contains more information than a RAW file.

2.8 Assignment

Select an area close to home and photograph it at several times during the day, preferably at midday, sunset and night (starting at sunset would be good but only if you're already awake).

Have your camera in Auto mode, so it will select the ISO. Then look at all of the shots you've taken and see if there's any noticeable noise at 100% magnification.

If you want to be more detailed, then try the same assignment but take multiple shots at different ISO settings each time. This will be very useful for the night shots, because it will give a good idea of how high you can push the ISO when needed.