



Module 1: **Equipment**

Module overview

In this module you'll learn about the following:

- How digital cameras work
- Which camera is right for you
- What equipment do you need
- Choosing the right lenses
- Accessories and essentials
- Equipment Tips



“You don't take a photograph, you make it.”

Ansel Adams
(1902 – 1984)

Tip: if you want to experience some of the challenges faced by early photographers, then a pinhole lens is a good addition to your camera bag. They are cheap to buy and even cheaper to make, using a body cap, a drill and a small piece of foil.

1.1 A Brief History of Photography

Photography is not a new concept. The word is derived from Greek and roughly translates as "painting with light", and the idea of capturing images has been around for centuries. The science behind photography had been theorised by ancient Greek and Chinese scholars, but it would be many centuries before these theories were perfected and realised with the invention of the camera obscura. The "darkened room", which is the Latin translation of the phrase, is the basis for all photography – essentially a sealed room using a tiny hole (or aperture) to project images onto a screen.



It's widely believed that many of the great artists, such as Jan van Eyck and Caravaggio, used a camera obscura to create the fine details that were a hallmark of their works.

By the 19th century, things had progressed to the point where it was possible to capture an image using the principles of the camera obscura. French inventor Nicéphore Niépce took the first photograph in 1826, using a rudimentary camera.



Tip: if you're considering buying a second hand DSLR (which can provide great value for money), try not to buy a camera from a pro or semi-pro photographer .

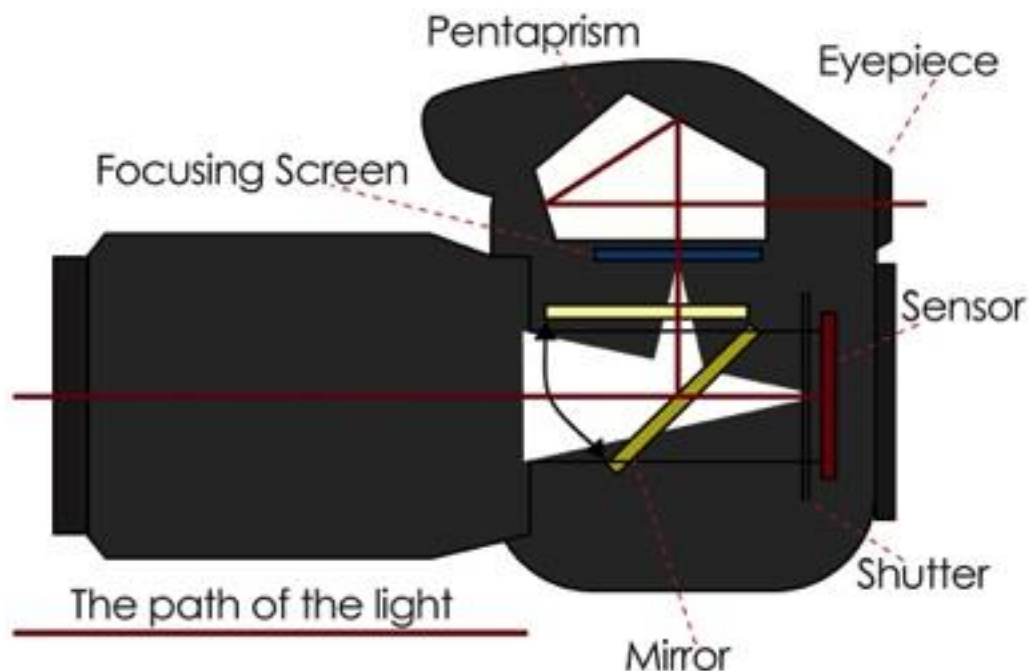
You might think that the camera has been well maintained, which is probably true, but usually this means it's been heavily used. Eventually, every shutter will break, so a camera that has been used less will last you longer.

From there, the technology was refined into modern film cameras that were widely used for most of the 20th century. If you're too young to remember, ask your parents. With the dawn of the digital revolution came the idea of creating a digital camera which would eliminate the need for film; images would be captured and stored either internally or on memory cards. The technology was developed during the 1980s and by 1991 Kodak had created the DCS 100, which was attached to the body of a film camera to capture digital images. However, there was a downside: the camera and storage system were bulky and the price was approximately £8,000.

Many professional photographers were (and some still are) sceptical of this new form of photography but were gradually won over as the cameras became able to replicate the image quality of professional film cameras.

1.2 DSLR Cameras

The Modern DSLR camera is based on the analogue SLR (single lens reflex); but instead of the image being projected through the lens onto 35mm film, it is projected onto a sensor. It consists of two main parts, the body and the lens. The lenses are removable and can be interchanged with those made for the same system. The term "single lens reflex" comes from the system mirror and prism system that allow the image to be viewed correctly through the viewfinder.



Light travels through the lens and is reflected by the mirror and then by the pentaprism. When the shutter is opened, the mirror lifts up to expose the sensor to light.

Unlike film cameras, all digital cameras also have LED view screen. This has led to the development of mirrorless cameras. These are a hybrid of DSLR and point and shoot cameras. They are small and light but have a removable lens, which gives you more options. If you find DSLR cameras unwieldy, then mirrorless might be a good option.

Tip: try shooting using each one of the settings. Even though it's usually better to use the manual mode, there might be situations where one of the preset modes is preferable.

1.3 DSLR Mode Dial

Every DSLR and most point and shoot cameras have a mode dial, which is used to switch between the different modes available on the camera. Every manufacturer has its own layout, but they are all very similar.



The illustration above shows a mode dial typically used by entry-level Nikon cameras.

The mode settings can be confusing if you're not used to them, although some of the icons are self-explanatory.

We'll look at all of them individually and explain what each one does.

Tip: if your camera has a different mode dial design and you're unsure about each of the functions, just consult the manual.

AUTO



Auto: the name is self-explanatory. Other than pointing the camera in the right place and pressing the shutter button, the camera will do everything for you. Although it's easy to use, it's not recommended for creative photography.

GUIDE

Guide: predominantly for entry-level DSLR cameras. It offers suggested modes for the type of photograph you're taking. It doesn't offer fully manual features. It's fine for beginners, but you'll quickly grow beyond this mode.

P

Program: the camera controls the shutter speed and aperture, but you still have the option to make your own adjustments. It is also possible to create your own pre-programmed settings.

S

Shutter priority: gives you control of the shutter speed; the camera will automatically adjust the aperture to compensate. Good for action shots. Sometimes this mode is called Tv.

A

Aperture priority: gives you control of the aperture setting with the camera automatically adjusting the shutter speed to give you the correct exposure. Sometimes this mode is called Av.

M

Manual: the setting that gives you complete control of your camera. It's the most difficult to use, but the most rewarding once you've mastered it.



Night portrait: uses slow shutter speeds and the built-in flash, balancing the two to look more natural even with the flash. Closest-subject AF is used, meaning that the subject closest to the camera will be focused on.



Close-up: this is not a macro mode. The settings are more conducive to shooting items close up; but to do true macro photography, you will need special equipment.



Sports: like the name suggests, it's ideal for shooting fast action. It uses faster shutter speeds and continuous focusing when the shutter button is pressed down half-way.



Child: boosts the sharpness and saturation (the amount of color), but softens the skin tones for a natural look. The flash will automatically pop up when required.



Landscape: boosts colour saturation, contrast and sharpening for city and forest landscape shots. Closest-focus AF is used and the AF-assist light and flash are turned off in this mode.



Portrait: adjusts the aperture to soften the background and help the subject stand out more. The sharpness and saturation are more muted, for more natural skin tones. The flash will pop up if the lighting is too low.



Auto (flash off): similar to automatic, except that the flash is disabled. So it's only used when you're shooting in places where flash is not permitted (art galleries and museums).

Tip: try to avoid buying cameras online. You can never be sure exactly what you're getting, especially when it comes to second-hand cameras. Try to find something in your local area, so you can try before you buy.

1.4 Choosing the Right Camera

There's a phrase commonly used by photographers: "The best camera is the one you have in your hand". This means that in the right hands, any camera can be used to create good photographs. The reverse is also true: give a top range DSLR to an amateur and the quality of their images will probably reflect their lack of knowledge and skill. Many great photographers have used entry-level DSLRs and many snappers own "professional" cameras. If you don't already own a DSLR camera, then look for an entry-level model like the Canon 700D or the Nikon D5300. Entry-level cameras will have fewer features than the higher-tier models, but as they're designed to be easier to use, they're great for beginners.

Remember – there are also other manufacturers apart from the Canon/Nikon duopoly. Pentax, Olympus, Sony and many others make some excellent cameras, so don't be put off by a camera that's not made by one of the "big two".

Two things that are constantly brought up when looking for DSLRs are megapixels and sensor size.



A pixel is a small square that makes up your image. If you zoom into an image using editing software, the more you zoom in, the larger the pixels appear.

1 megapixel = 1 million pixels. Is this important? Not really; this is something that camera manufacturers like to use as a selling point; but in reality if your work is only being viewed on a computer monitor, then the megapixel count is irrelevant.

Even when it comes to printing your photographs, any camera with over 6 megapixels will print at almost any size. The quality may not be as good when printing very large images, but remember that they are not meant to be seen close up. For example, a large billboard image will look fine from a distance – but when viewed close up, you will easily see the individual pixels; but who looks at a billboard close up? The larger the print, the further the viewing distance. So the Megapixel factor is not as important as some people will have you believe.

Tip: when buying lenses, remember to take into account the type of sensor your camera has. If you have to buy a 50mm lens for a camera that has a 1.3x crop sensor, then the lens will actually be 65mm.

Sometimes it's difficult to calculate, but Nikon crop sensors are all 1.5x. So you need to add 50% to the focal range. For example, a 70mm lens becomes a 105mm lens.

The same goes for aperture, but that will be covered in a later module.

Another camera myth is sensor size. Basically there are two types of sensor, full frame and crop. However, crop sensors come in different sizes. The image below shows the difference between full frame and crop sensors. For example, if you're using a 100mm lens on a full frame body, then the lens is still 100mm. If you use the same lens on a camera that has a 1.5x crop sensor, then the lens becomes 150mm.



Black - Full Frame
Red - 1.3x Crop
Blue - 1.5x Crop
Yellow - 1.6x Crop

Conventional wisdom says that full frame is better: is this true?

Well, yes and no. Full frame has its advantages, the main one being image quality; but full frame DSLRs are larger, heavier and more expensive than their crop sensor counterparts. Also, if you're using a full frame camera, then to make the most of the larger sensor you have to use the highest quality lenses, which also adds to the price. So unless you're being paid large amounts of money to photograph high-profile fashion shows or sporting events, having a full frame camera is not necessary.

If you have a larger budget, then it's better to invest in good-quality lenses that you can keep for years (as long as you use the same camera system); then you can replace the body any time you want. So if you're serious about photography, remember that your camera is a tool, not a status symbol.

1.5 Choosing the Right Lenses

There's no such thing as the perfect lens, but there is the right lens for the right situation.

If you've already bought your DSLR, it probably came with a lens, usually an 18-55mm; this refers to the focal length of lens.

Tip: there are two basic types of lens: zoom and prime.

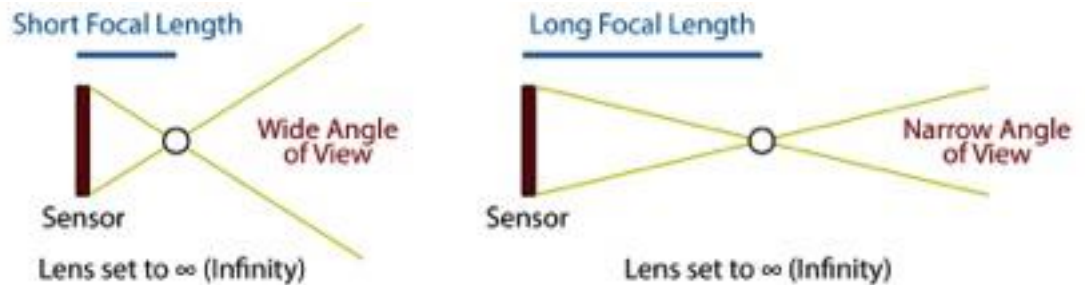
A zoom lens is self-explanatory, meaning that you zoom in or out. A prime lens has a fixed focal length.

Zoom lenses can be very useful, but prime lenses

Tip: when choosing a lens, remember to account for the crop factor, unless you are using a full frame camera.

What is focal length?

In basic terms it refers to the distance between the sensor and the optical centre of the lens. In practical terms, it refers to the type of lens. A standard lens usually has a focal length of 35-50mm; anything below that range is a wide angle lens and anything above is a telephoto lens.



An 18-55mm lens is useful; at 18mm, you get good wide-angle coverage and the 55mm will give you a reasonable zoom capacity. However, this lens will only get you so far. So you should consider adding at least one more lens to your collection. That additional lens will depend on the type of photography you're interested in.



This illustration shows the coverage given at different focal lengths. In this example, the 18mm give the widest field of view, which starts to narrow as the focal length becomes longer, reaching full zoom at 100mm. Note that there are many lenses that offer a wider angle and lenses that allow you to zoom in much closer.

1.6 Accessories

A DSLR body and lens are obviously essential, but there are other things you will need in your camera bag (yes, you will probably need a camera bag or back pack to carry all of your accessories).

Lens Filters

There are many lens filters available; most photographers will use a UV filter. Their original purpose was to filter out blues when shooting in daylight, but this was only a problem for film cameras.

Tip: another useful lens filter is a neutral density filter. They are mainly for darkening strong light, if you need to use a slower shutter speed.

As digital cameras don't have this problem, there's differing opinions on whether they actually serve a purpose. Some will argue that they protect the lens, which is true, but a lens hood also does the same. Others will argue that having a useless piece of glass in front of your lens will have a negative effect on image quality. So it's a matter of

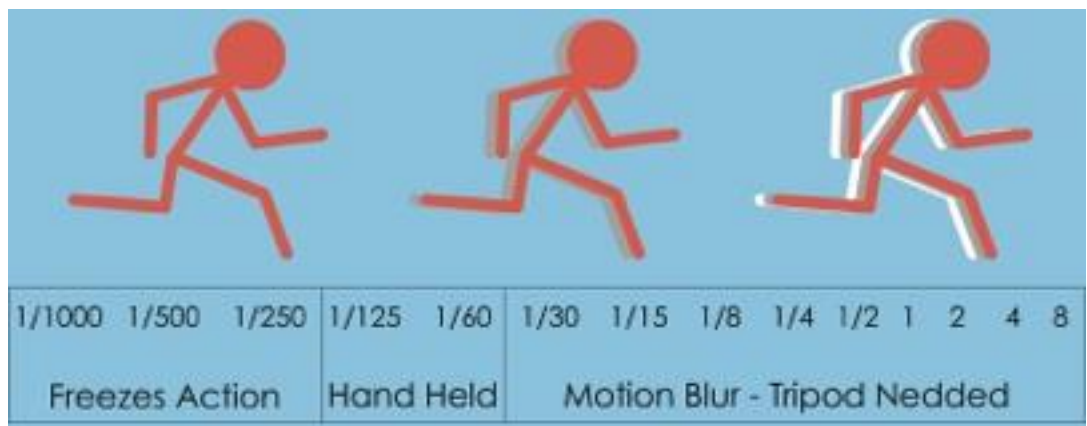
If you're interested in shooting landscapes, then a polarising filter is a great tool. Its main function is to darken skies and increase contrast when clouds are visible, which creates a dramatic effect. It also reduces reflections on surfaces like glass or water. They come in two different types: linear and circular; the linear filters are more effective but circular ones are easier to use.



Tip: an alternative to a tripod is a monopod. Like the name suggests, it has one leg instead of three. It lacks the stability of a tripod but can be a good way to stabilise your camera in situations where you have to move around quickly, such as weddings and sporting events.

Tripod

We'll deal with shutter speed and exposure in more detail in later modules, but sometimes you will need to use a longer exposure than you might prefer. Using a tripod will help to stabilise your camera and allow you to take longer exposures without motion blur or camera shake.



The diagram above shows how different shutter speeds affect motion blur.

Battery Pack

If you're on a long shoot, the chances are your battery will start to run low, so it makes sense to have either a spare battery or what's known as a Grip, which attaches to the camera body via the battery port. It can hold two batteries, which doubles the time you can shoot for. Most grips also come with an AA battery adapter, so you never have to worry about running out of batteries. The downside is that it makes your camera larger and heavier. So if this is a concern, just stick with carrying a spare battery.



Tip: another essential storage device to have is an external hard drive. Your memory cards will eventually fill up and you could find yourself will 100s of gigabytes worth of images. You can store these on your computer, but it makes sense either to back up everything to a separate hard drive or simply to store everything there.

Early external drives had smaller capacities than most modern memory cards; but thanks to advances in laptop technology, you can now get 1 terabyte (equal to 1,000 gigabytes) drives for a reasonable price.



Memory Cards

Most DSLR cameras will come with a memory card, but it's usually only 8GB. For some people, this is enough; but if you're shooting in RAW format (more about that later), then you might find your memory card filling up very quickly. A 32GB card is a good investment and you can keep the smaller card as a backup.

DSLR memory cards come in three different formats. The most common is the SD card, especially with entry-level and mid-range cameras. Most full frame DSLRs will use the CF system and many will have two card slots for a CF and SD. Olympus uses the smaller XD format, but most of their DSLRs have two slots, one for CF and one for XD.



XD

SD

CF

The SD card is the most commonly used and most PCs and laptops will have an SD port. If you're using XD or CF, then you may need a card reader; the alternative is to connect your camera using a USB cable.

Remote Shutter Release

As well as employing a tripod, another way to reduce camera shake is to use a remote shutter release. If you're using a long shutter speed, then sometimes just touching the camera to press the shutter can cause camera shake, which can blur your images.



Wireless Shutter Release

Cable Shutter Release

Tip:

occasionally, a lens cap falls off or just gets lost, so it's a good idea to buy a spare. It doesn't have to be the same brand as your camera: a generic cap will do the same job and cost less.



The wireless version has the advantage of not needing to be connected to the camera and is useful if you're creating self-portraits – but they are no more than a remote shutter. The cable versions usually have a lot more features, including a timer and shot count setting; these are good functions for time lapse photography.

Lens Cleaning Kit

Maintenance is important and no matter how much you try to keep your camera clean, eventually dirt and dust will get into your lens. If you want your lenses to last, then it's important to keep them clean.



Make sure you follow carefully the instructions provided, because incorrect cleaning can sometimes do more damage to your lenses.

External Flash

Even if your DSLR has a built-in flash, it will not be very powerful, so if you need to take photographs in low light situations then an external flash unit is essential. Firstly, it's more powerful than a built-in flash, which means you can illuminate areas from a greater distance. Try shooting something from more than 10 feet away with your built-in flash, then try the same shot with an external flash; the difference will be shocking.

Another advantage is the adjustable heads, which means you can angle the direction of the light to make it bounce off walls or ceilings; sometimes the light from a flash can be very harsh, so bouncing the light is good way to illuminate your subject without the harsh glare.

Flash photography can be tricky, though; it adds a whole new set of variables when it comes to calculating your exposure.



Tip: it sounds like common sense, but always check the weather forecast before going on an outdoor shoot. If there's potential for bad weather, then either plan accordingly or reschedule.

1.7 Other Items to Consider

If you're going to be spending the day shooting outdoors, there are some items that might be useful.

A Swiss army knife or multi tool

If you're shooting outdoors, especially when there's foliage, it helps to be able to remove quickly anything that might be getting in the way of your shot.

Electrical tape

Again, this is also useful for removing unwanted items; if it's something you don't want to cut, then simply tape it.

String or fishing line

A third option is to tie something down' for example, if there's a plant or flower in your way, it can be tied down without causing any damage.

Maglite or hand-held LED light

Because you never know when you might need some extra illumination, especially if you're try to check your camera settings at night; is also good for light painting experiments.

Note pad with a pen or pencil

Even though your camera records the settings for each shot, sometimes it helps to take notes for future reference.

A small first aid kit

Sometimes accidents happen.

Water and snacks

Dehydration and low blood sugar are a bad combination, especially when your full concentration is required.

1.8 Summary

- Knowing how your camera works is important.
- Familiarise yourself with all of the different modes available on your camera.
- Don't worry about the megapixel myth; anything over 6MP is just fine.
- If you're thinking about buying a full frame DSLR, ask yourself "Do I really need one"? Perhaps that money could be better invested in good-quality lenses.
- When it comes to buying accessories, remember that you don't have to buy the same brand as your camera. There are many good third-party manufacturers who make very good equipment. Make sure you're not just paying for the brand name.
- A good tripod is important; it doesn't have to be huge, but it has to be sturdy. Most lightweight tripods are essentially useless, as they offer little stability.
- Don't buy equipment you don't need – you're only making your camera bag heavier for no reason.

Assessment 1

- 1) Which light-projecting device pre-dates the invention of the camera?
- 2) What does the acronym DSLR stand for?
- 3) What is the purpose of the mirror in a DSLR camera body?
- 4) Which part of the camera is used to focus light into a clear image?
- 5) How is it possible to view an image through the eyepiece?
- 6) What is the difference between a wide angle lens and a telephoto lens?
- 7) What is focal length?
- 8) Which type of lens filter darkens skies and reduces reflections?
- 9) What is the difference between a tripod and a monopod?
- 10) If you're using a 50mm lens with a 1.6x crop sensor, what will the actual focal length of the lens be?

1.10 Assignment

Try shooting using each one of the pre-programmed mode settings on your camera; for each shot, take a comparison shot in auto mode.

For example, use night portrait mode to take a picture of someone outdoors at night, use the landscape mode to take landscape shots and so on.

Make sure to take an auto mode straight away after every shot.

When you've finished shooting, look at the results on your computer and see how the pre-programmed shot differs from the auto shot; choose which image you prefer and keep a count (all the preset modes will count as one group and auto shots will count as another group).

After you've chosen your favourites from each comparison shot, see which mode has the most favourites, the preset modes or the auto mode.