Class booklet

Workshop 1

Camera settings

Tips & suggestions

1 Exercise your eye

We recommend you attend a maximum number of photo exhibits and consult the works of the masters of photography on a regular basis.
Exercising one's eye is one way to progress. It helps you recognize your tastes and helps the composition of your images as you move forward.

2 Continue

You will follow the photography initiation training for beginners. We think that you could enjoy the thematic courses as a logical follow-up to your training. You will be able to discover new, more thematic subjects such as composition, portrait, night photography or Lightroom software.

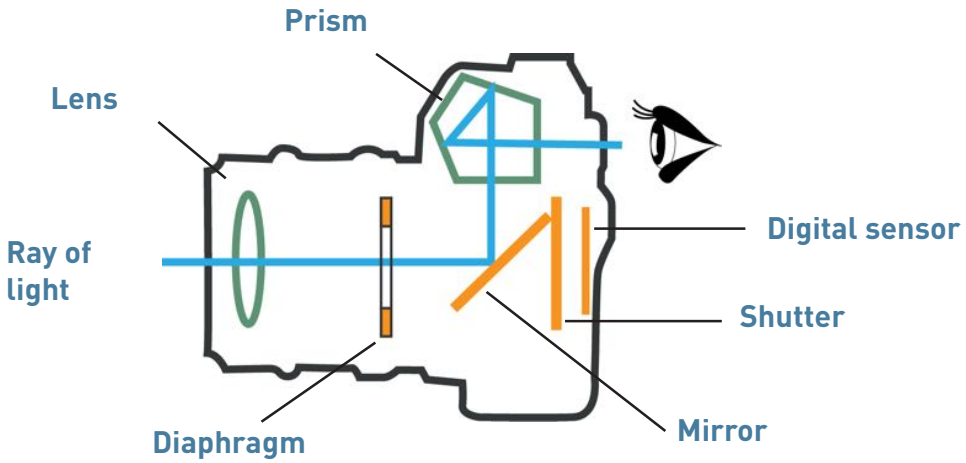
3 Discuss with others, get inspired

Try to **share your love of photography** throughout the year with other passionate image-makers. Photo festivals, conferences, and portfolio reviews can be good ways of **making connections and building your artistic network.**

#1

THE CAMERA

Apart from some structural details that differ according to their manufacturers, all modern cameras operate on the same set of principles and include the following basic elements:



When pressing the shutter release button, the mirror rises. When triggered, the shutter opens to let light through the lens to provide a clear image of the subject being photographed. The amount of incoming light is determined by the time the shutter remains open and the size of the aperture. At the end of the exposure, the shutter returns to its original closed position.

#2

FILE FORMATS

This is the format in which images are saved to the memory card.

The various image or file formats used by digital cameras are presented here and choosing the right one greatly depends on the type of image created and its future use:

JPEG

The most commonly used format. It is universally legible and creates a 'light-weight' image file BUT there is the risk of deterioration and data loss if the selected JPEG quality is too low (see example below).
The JPEG image is transmitted easily with the usual means of communication (email, Facebook, Flickr, ...) and is printer ready. This is an ideal format for maximizing the number of photos saved on a memory card (see table below). Image optimization is feasible via the camera's menus to adjust colour saturation, contrast or conversion to black and white.

RAW

This format is most used by professional photographers because it allows for full control of the 'raw' image waiting to be processed while keeping the original unchanged. The images in this format take up a lot of space on one's memory card.
It makes more sense to choose this format when the exposure conditions are difficult, i.e. a high contrast scene, shooting against light, a very cloudy or white sky and when the white balance is difficult to adjust (see next section).
Each manufacturer offers its own RAW format. Electronic files can have a variety of '.' extensions like : .ARW with Sony, .NEF with Nikon, .CR2 with Canon, etc ..

Generally, all camera makers offer the RAW + JPEG option. It is best to avoid choosing the wrong aspect ratio.

Example of the number of photos on an 8 GB memory card (Nikon nomenclature) based on the number of megapixels for a digital sensor.

Format	36 MPx	24 MPx	21 MPx	18 MPx	12 MPx
RAW	100	150	171	200	300
TIFF	69	104	118	138	207
JPEG Fine	237	356	406	474	711
JPEG Normal	473	710	811	946	1419
JPEG Basic	930	1395	1594	1860	2790
Raw + JPEG Fine	70	105	120	140	210
Raw + JPEG Normal	82	123	141	164	246
Raw + JPEG Basic	90	135	154	180	270

JPEG quality 10% - 29 ko

JPEG quality 100% - 199 ko

The loss of quality in the nuances of colour due to the high level of data compression

#3

WHITE BALANCE

The white balance compensates for the different colours of light being emitted by different light sources captured by the camera when you take a picture.

A digital camera analyzes a scene using its white balance mode to determine areas that should be recorded as pure white. The camera adjusts the overall scene's colour balance so that the areas meant to be reproduced as white in the picture will be white, thereby also adjusting all the other colours in the scene using the same colour shift values; this way all colour is accurately represented. A digital photographer can usually set the white balance to suit the colour temperature of the light falling on the subject. Some cameras can automatically set white balance.

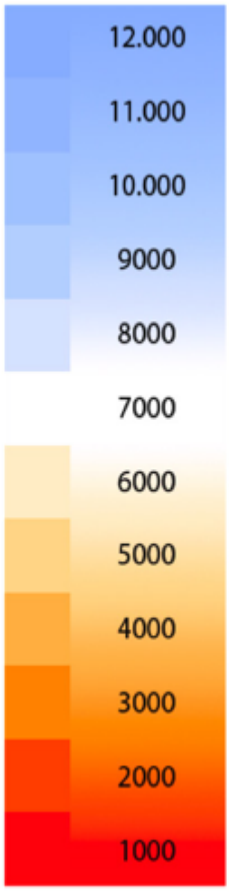
Note that this can be easily changed later using imaging software (Lightroom or Photoshop for instance) if you used the RAW format while shooting.

It is advisable to leave the setting on "auto" as it generally provides good white balance in standard light conditions.

It is possible to use a neutral gray card and photograph it in order to have a reference for your photos taken under the same lighting conditions.

The concept of colour temperature

Some cameras offer Kelvin settings between 2,500 and 10,000 K. It should be enough to set this value to that of the colour temperature (see diagram below).
The camera will apply a dominant colour to neutralize the light, for example, it will compensate by adding blue from 2,500K. At 10,000K, yellow would be added.



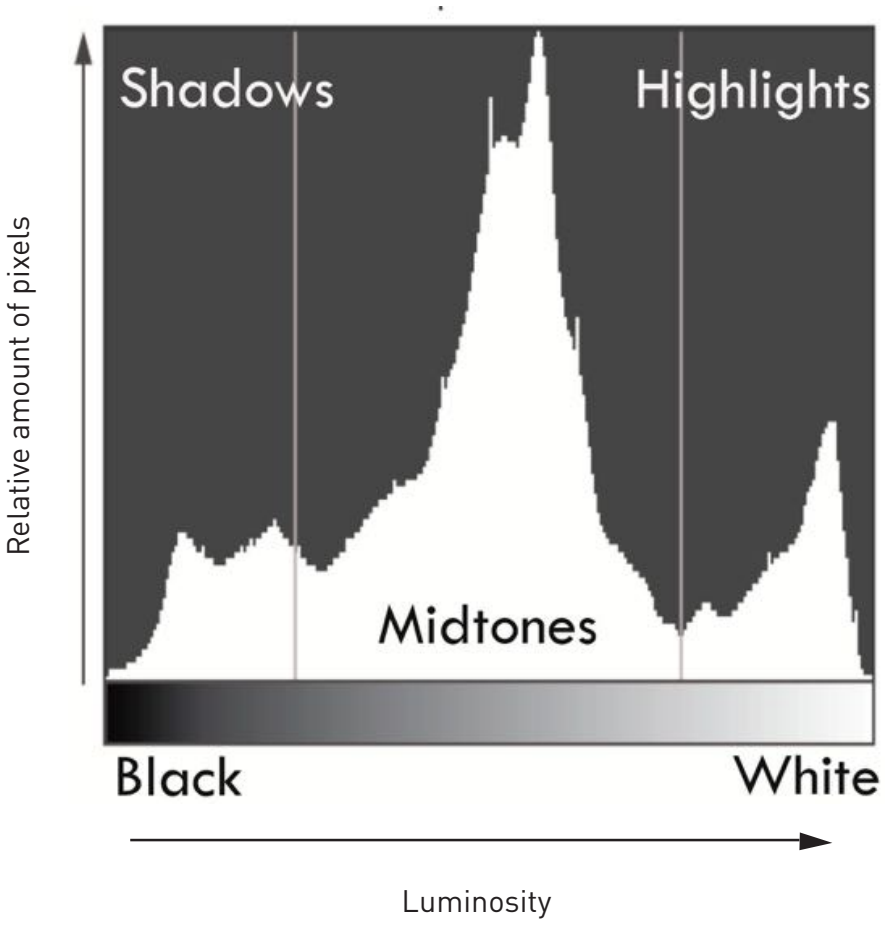
#4

THE HISTOGRAM

A histogram is a graphic representation of the range of tones from dark to light within a photo and allows you to control the quality of the exposure of a photo, the contrast and the richness of details.

Principle

One of the great advantages of digital photography is the ability to have immediate control of your shots. The histogram allows the photographer to verify on the spot the success – or failure – of a photographic exposure.


Shadows
Highlights
Midtones
Black
White
Relative amount of pixels
Luminosity

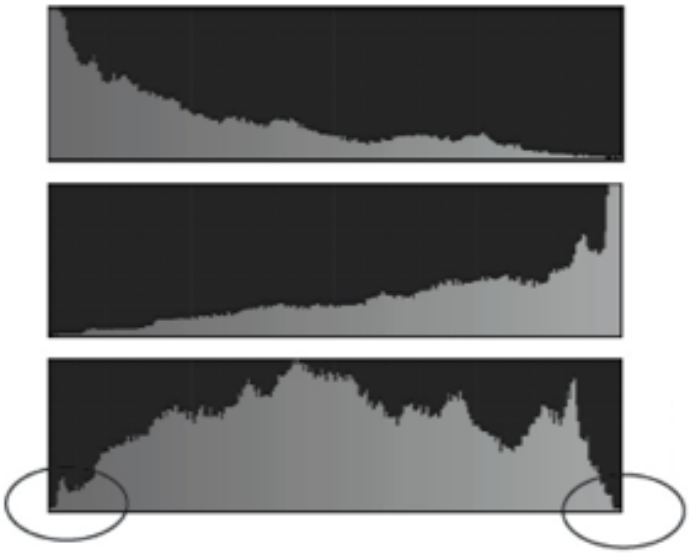
#5

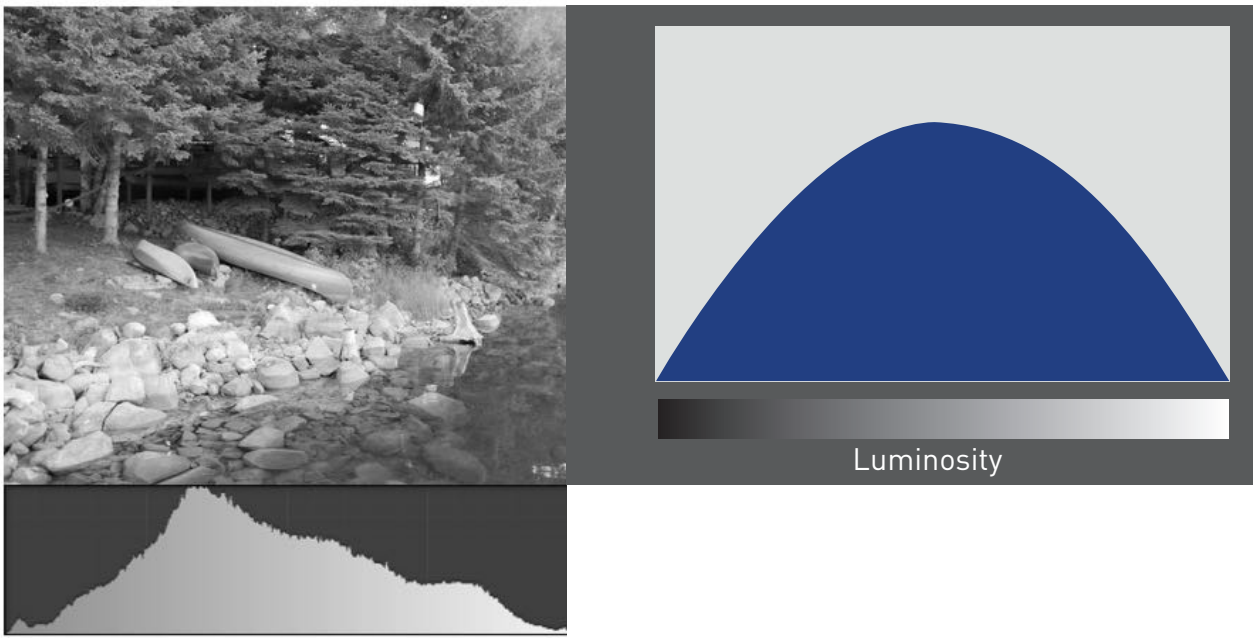
INTERPRETATION OF THE HISTOGRAM

There is no ideal curve for a histogram because subjects and exposure conditions vary considerably from image to image. However, the review of histogram information gives valuable information on contrast, richness of detail and the quality of the exposure within the image.
The quality of the exposure will be shown by a curve that falls within the histogram window (see an illustration below).

Contrast is defined by the distance between the dark areas and light areas of an image. A picture has good contrast when it contains areas of deep black and solid white. In terms of the histogram, this results in a curve that reaches both the left side (the blacks) and the right side (whites) of the window without bumping against the sides. If your historgram reaches the outer limits/touches the sides of the histogram window you would be dealing with under- or overexposed imagery. A high-contrast image will be represented by a "U" shaped histogram showing a large area of the image in dark tones and light colours with few midtones.
A lack of definition in details in the dark zones or light zones will be re ected by an abundance of dark or light colours; the curve will be narrow and have a compressed appearance.

The following examples illustrate the aspects defined above :

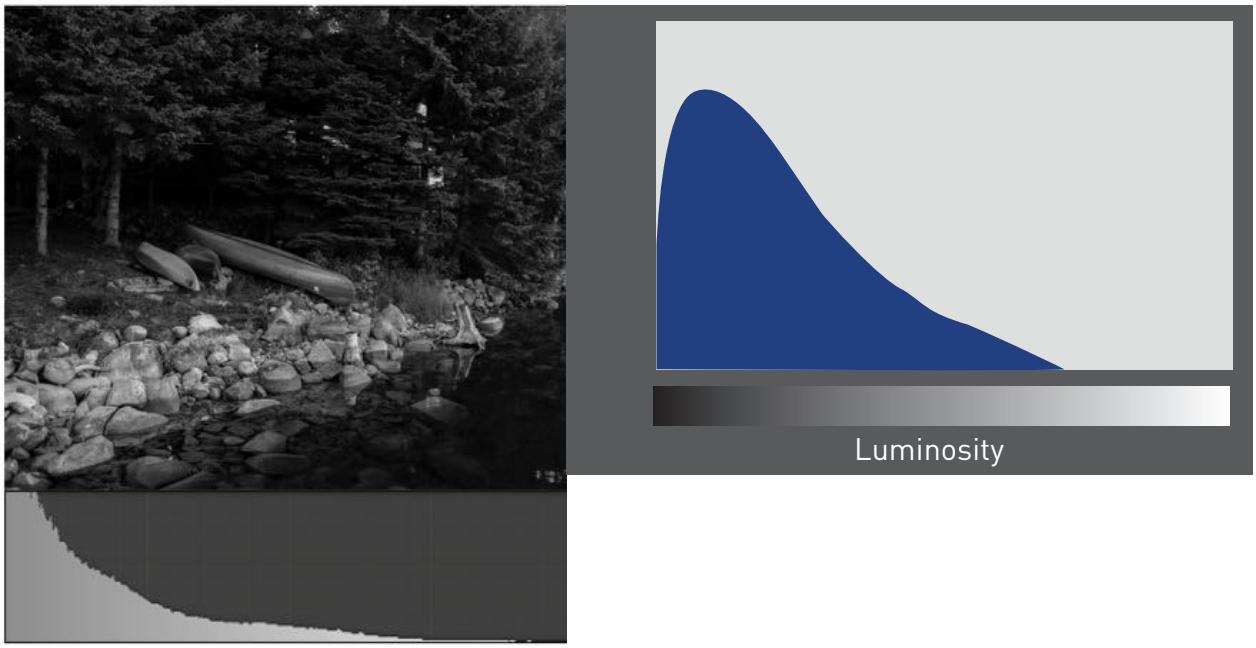




Correct exposure

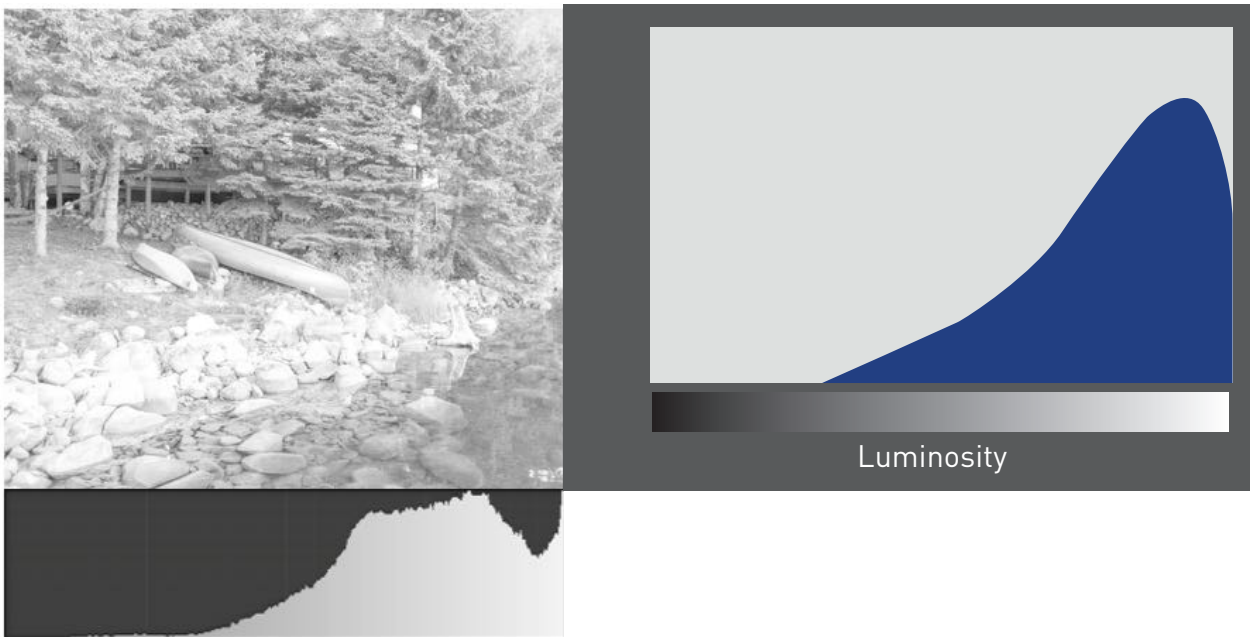
The histogram should look like the above diagram when a maximum of detail is desired with maximum contrast. The curve goes from black to white without touching the sides of the histogram window.

The maximum in midtones is not necessary and depends on the particular photograph, as shown in this example where the maximum is on the left side of midtones.



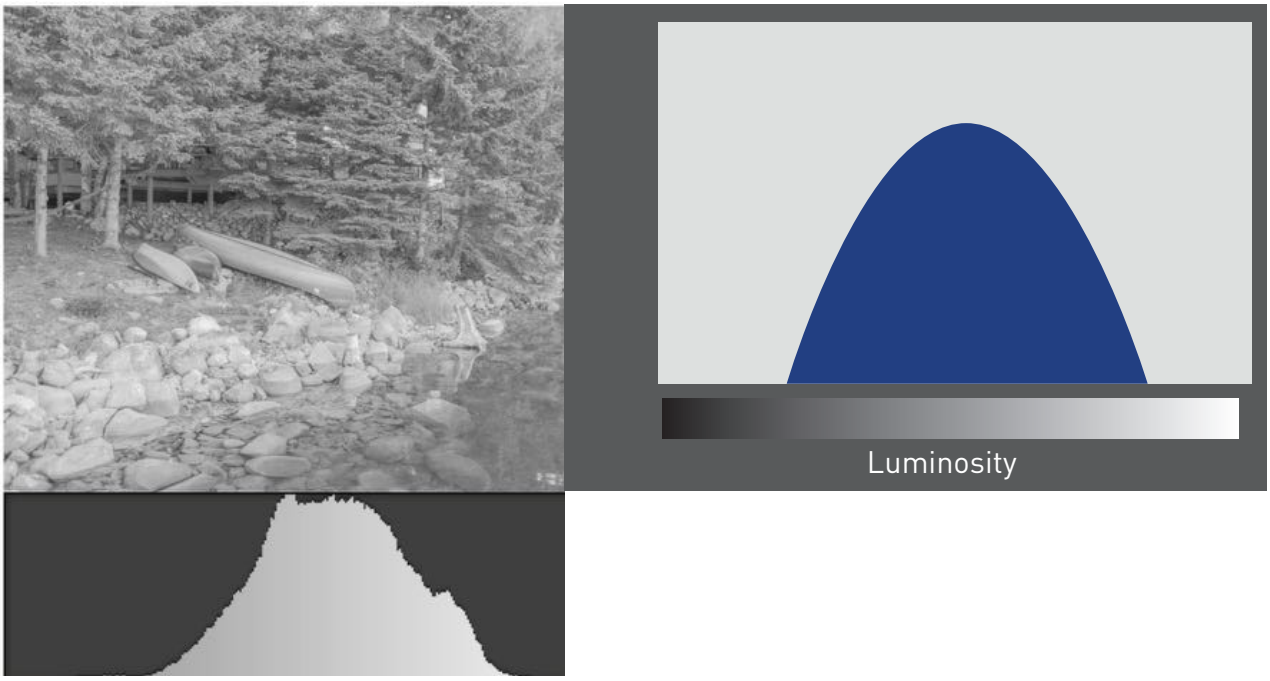
Underexposure

When the curve does not appear in the full black to white range, it means you have a low contrast image. Additionally, the curve is compressed on the side of the histogram where the shadows appear which means few details will be found.



Overexposure

White will be the overall colour in this image which is missing its blacks. Black is the primary way to give it contrast. The curve ends on the side of the histogram where there are highlights. The image is overexposed and will give very few details in highlights.



Low contrast

This photograph is well exposed as the histogram curve is neither in the blacks (shadows) nor in the whites (highlights). However, the contrast is low since neither black nor white are present.

#6

USING THE HISTOGRAM

In most cases, the histogram will have a notched or ragged appearance. At first glance, your histograms won't seem to correspond with the examples above. That said, these ideal curves represent the main principles of the histogram fairly well. With a little experience, it is possible to come to the right conclusion regarding tonal distributions of actual cases resembling those shown in the previous section.

Understanding the histogram is a great asset in the correct use of the exposure compensation tool.

#7

EXPOSURE COMPENSATION

Exposure compensation lets you adjust the quality of the exposure proposed by the camera by adjusting for under-or overexposure of your image, which might be too bright or too dark. (AV andTV with Canon A and S with Nikon).

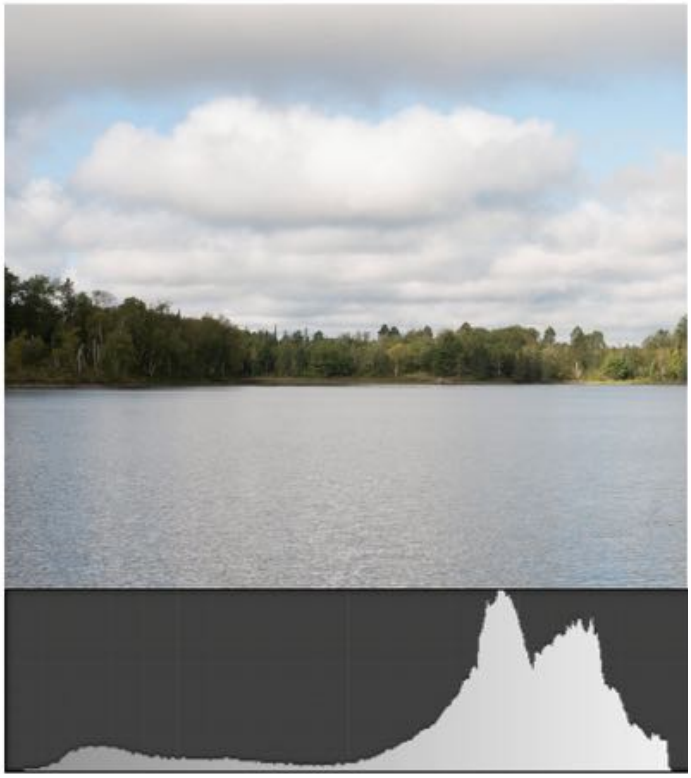
This tool is represented by the following icons on the reflex cameras and can adjust the exposure suggested by the camera.

When pressed and used with the corresponding dial, this button allows for underexposure or overexposure depending on the desired result.

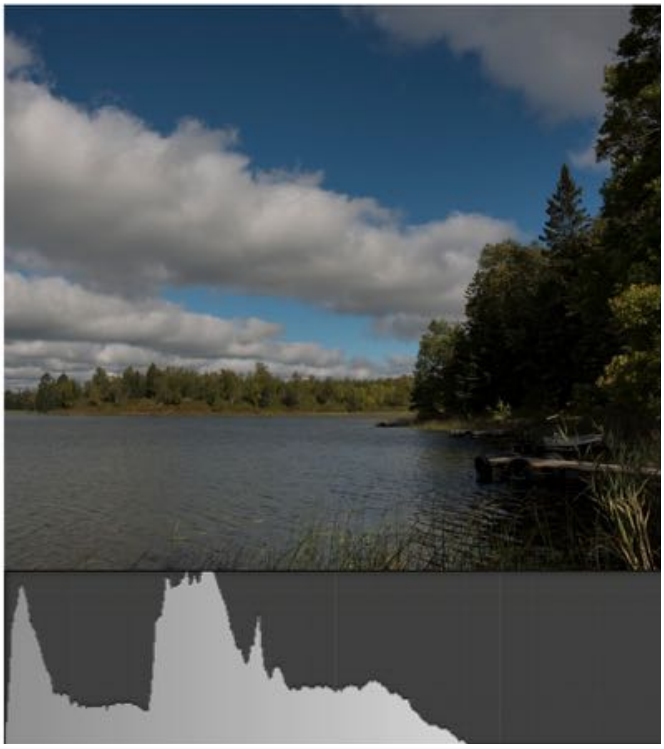
Observing the histogram can indicate – with some experience – what should be the extent of the exposure compensation value.

Don't forget to reset this button to the neutral setting in order to avoid bad surprises during your next photo shoot!

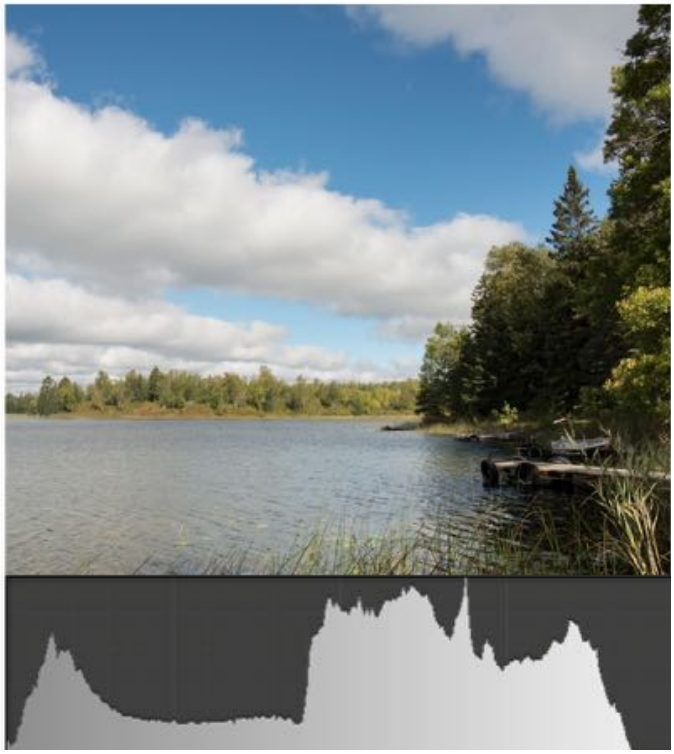
The camera here proposes an exposure that will give few details in the highlights. The clouds in particular are poorly defined and the overall impression is that of a picture with low contrast.



By using exposure compensation with a value of -1 you can “stretch” the highlights of the image’s histogram.



In this example, the histogram shows a lack of clear tones and highlights are absent.
Accordingly, the image has low contrast and a lack of detail in the shadows with a narrow peak corresponding to the shadow area.

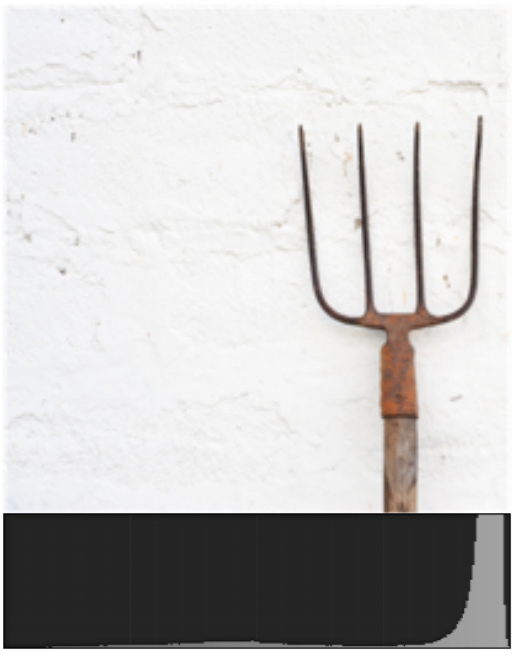


The exposure compensation +1 allows you to find the details in the shadows (note that the part of the histogram corresponding to the shadows is stretched) and the highlights are more present. The whole scene has gained contrast. An exposure correction of +1.3 would allow recovery of the last empty areas of the histogram in the highlights.

Subjects and scenes that are darker or lighter often require the use of exposure correction since the tendency of the camera, when measuring light, is to propose an “average” exposure producing an abundance of midtones.

On the following example of a white wall, the camera reads the light incorrectly and renders the wall gray, which you will see on the histogram. With an adjustment of +2, we can correct this and the wall will be properly recorded as white.

0



+2

#8

SENSITIVITY / "ISO" (OR ASA)

The sensitivity of the digital sensor is expressed as an ISO value. The higher the value, the more sensitive the sensor and thus allows shooting in low light conditions.
This increase in ISO value is accompanied by digital noise at the high end of the spectrum and can cause deterioration in the quality of your image (see example below). The sensor "sees" nonexistent light called artifacts. There are two kinds: the luminance (see example with the appearance of dark and bright pixels) and the colour (red and blue pixels appear).

Low ISO

High ISO

#9

SITUATIONS THAT CAUSE NOISE

- Increasing the ISO sensitivity causes a deterioration of the image, also know as "noise"
- Low light situations
- Night photography using long exposures
- JPEG compression

How to reduce noise in your photos:

- Photograph at the lowest possible ISO
- Use a noise reduction filter when editing in Photoshop / Lightroom
- Use the RAW format as opposed to JPEG

An introduction to the exposure triangle

The exposure triangle uses three settings to make a well-balanced photo: aperture, shutter speed and ISO.

Proper exposure is obtained by combining the ISO with an appropriate aperture and exposure time (shutter speed).

The same exposure – and identical histogram – can be achieved using several combinations of these three parameters. The exposure will be identical but the rendering of the image will change. The aperture priority, shutter priority and manual modes will be addressed during workshops 2, 3 and 4 respectively and will illustrate this point.

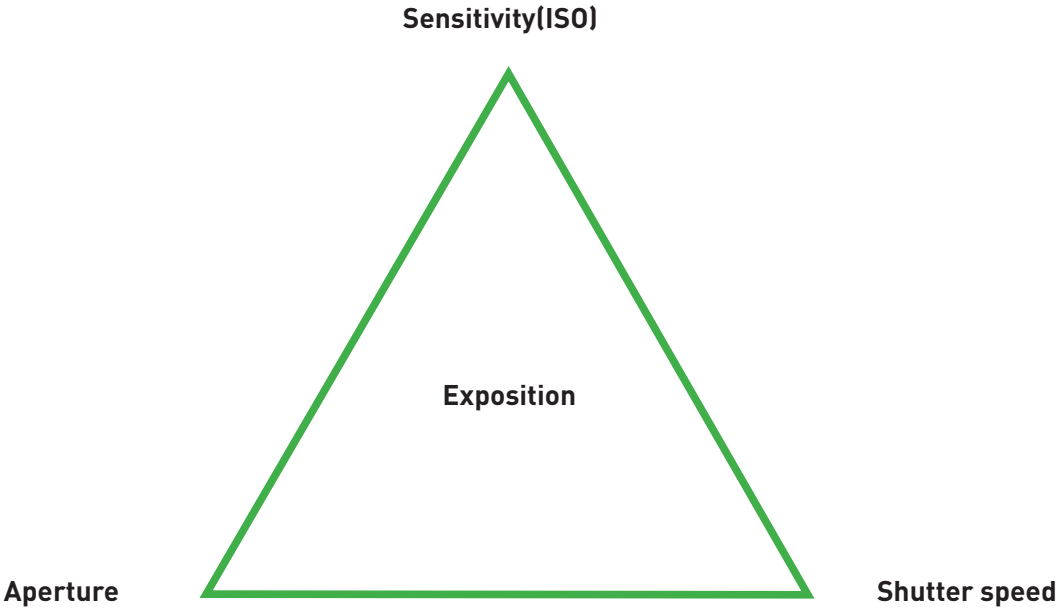
MODES : (According to the manufacturer, the names vary: A&S = Nikon or Sony, Av&Tv = Canon)

P (program) - the photographer selects the ISO and the camera sets everything else automatically for correct exposure.

A or Av (aperture priority/value) - the photographer selects the ISO and aperture and the camera sets the shutter speed for correct exposure.

S or Tv (shutter priority/time value) - the photographer selects the ISO and the shutter speed and the camera sets the aperture for correct exposure.

M (manual) - the photographer choses each of the three parameters manually.



#10

“P” MODE

The “P” mode allows the photographer to have control of one exposure setting: the ISO value.

The aperture and shutter speed will always be determined by the camera, but you can still adjust aperture using the turn wheel on the camera body. In this case, it might be better to directly use the aperture priority mode (A or Av on the camera).

Notes

GLOSSARY OF PHOTOGRAPHIC TERMS

A

Autofocus:

A system of sensors and motors that allow lenses to obtain focus automatically; in some cameras, the system also allows the lens to maintain focus on a moving subject.
Autofocus can be Continuous, meaning focus is maintained regardless of where it moves within the frame, or Single, meaning the point of focus is locked regardless of where the subject may move.

B

Backlight:

When the light source is behind the subject.

C

Cell:

A device for measuring the light to adjust the exposure of a camera.

Collimator:

The collimator shows the area of the image where the distance is set (in an autofocus system) for focusing. It may also be used for light measuring in case of "spot' measuring mode.

Chromatic Aberration:

Colour fringing that occurs when a lens does not focus different wavelengths (colours) of light equally. The results of chromatic aberration (green or purple generally) are most noticeable around the edges of high-contrast images, especially toward the edges of the frame. Chromatic aberration is most common on less expensive lenses, although even the best optics can occasionally display lower levels of chromatic aberration under certain conditions.

D

Depth of field:

The range of distance in a scene that appears to be in focus and will be reproduced as being acceptably sharp in an image. Depth of field is controlled in particular by the lens aperture, and extends for a distance in front of and behind the point on which the lens is focused.

Diaphragm or aperture:

A ring or plate with a hole in the centre, the size of which controls the amount of light entering the camera. An adjustable diaphragm enlarges or reduces the size of the hole, or aperture permitting more or less light to pass through the lens to the film or digital sensor.

E

EXIF (Exchangeable Image File):

Data produced by a digital camera that is attached to each image made by that camera (including information about the model of the camera, various settings, time stamping, etc).

Exposure:

It is the phenomenon of light striking the surface of film or digital imaging sensor. The exposure is determined by the quantity of light passing through the lens aperture (defined by the f-stop) combined with the duration of the exposure (shutter speed), hitting a sensor with a given sensibility (ISO).

The proper exposure, which is best determined by the light-metering cell, can be established in a number of exposure modes including manual, program (automatic), shutter priority and aperture priority.

Over-exposure: a prolonged exposure resulting in too much light that can 'wash out' or erase important image details. These "burned" zones of the images will show in pure white.

Underexposure: an inadequate exposure resulting in overly dark areas in the image.

Exposure Modes:

P - Programmed Auto: the camera sets the shutter speed and aperture for optimal exposure.

S or Tv - Shutter Priority / Time Value: User chooses the shutter speed; camera selects aperture for best results.

A or Av - Aperture Priority / Aperture Value : User chooses aperture; camera selects shutter speed for best results

M - Manual: User controls shutter speed, aperture and ISO.

Exposure time:

The exposure time is the time required for the digital sensor or film to be properly exposed.

Editing:

The process by which you choose the best imagery for presentation or story telling.

F

Focal length:

It is the distance between the focal point of a lens and the film plane when the lens is focused at infinity. It is used to designate the relative size and angle of view of a lens, expressed in millimeters (mm). A particular lens' focal length can generally be found engraved or printed on the front of the lens.

In 24x36 mm format a focal length of 50 mm is considered a normal lens, a focal length less than 40mm corresponds to a wide-angle lens while a focal value greater than 70mm is a telephoto lens.

Focus:

(1) A point at which converging rays of light meet after being refracted or reflected.

(2) The focal point of a lens.

(3) The clear and sharply defined condition of an image, as in " is image is in focus."

(4) The adjustment of the distance setting on a lens to obtain a sharply defined image, as in to focus a camera.

File format:

The way an image is saved to a digital camera's memory. JPEG, TIFF and RAW (DNG or other proprietary le formats) are the most common formats found in digital cameras.

Fill-in:

The use of a flash during the day when facing the sun so as to balance the natural and artifcial light. This technique opens up the shadows.

H

Histogram:

A graph that shows the distribution of the tones in a digital image, ranging from black (left) to white (right). A photographer can use a histogram to understand and manipulate exposure. Many digital cameras have the ability to show the photographer a histogram of an image he or she has taken. Most image editing applications can create a histogram for an image.

I

Image definition:

The definition of an image corresponds to the total amount of pixels within that image, obtained by multiplying the amount of horizontal pixels by the amount of vertical pixels. It is usually expressed in mega pixels or million of pixels. the definition will have an impact on the maximum size of print of a picture.

ISO:International Standards Organization (or ASA):

ISO in digital photography represents the sensitivity of the electronic sensor that captures the image and is designated by a single, almost universally-accepted common rating system which uses the initials "ISO" before the digital camera's sensitivity setting number - e.g. ISO 100. The higher this value, the more sensitive the sensor is.

J

JPEG:

Join Photographic Experts Group.
A standard for compressing image data where the size of the file is reduced. JPEG, with its 16.7 million colours, is well suited to compressing photographic images. A "JPEG" image file name carries the extension "jpg" (e.g. "portrait.jpg"). Many people refer to an image in JPEG format as a "JPEG," pronounced "jay-peg".

K

Kelvin:

A unit of temperature. In photography, it refers most often to the temperature of a colour. The visible light spectrum is scientifically described in terms of colour temperature, and is measured in degrees Kelvin (K).

L

Lens:

A true "lens" is a single piece of glass (or other transparent substance) having one or more curved surfaces used in changing the convergence of light rays. What we commonly call a photographic lens is more accurately and technically called an "objective," an optical device containing a combination of lenses that receives light rays from an object and form an image on the focal plane. However, dictionaries have come to accept the usage of the term "lens" to mean the entire photographic objective itself. A photographic lens will always be called a lens, even though it is not a lens, but has a lot of lenses in it. A camera lens collects and focuses rays of light to form an image on a digital camera's sensor or a traditional camera's film.

Light:

-High light: The most luminous zones in an image.

-Incident light: Light falling on a surface - not the light reflected from it. Incident light rays are those that strike an object.

-Low light: The darkest zones of light in an image. A low light zone can also be considered a shadow.

-Reflected light: The light reflected off a subject. The camera sensor and the film pick up on this light.

M

Mégapixel:

Refers to a million of pixels and is used in describing the number of pixels that a digital device's image sensor has. See "Image definition".

N

Noise:

Parasite pixels that distort a digital photograph. Superimposed pixels on the image can appear distributed in a regular or irregular fashion. The intensity depends on numerous factors (sensitivity, luminosity, temperature, the size of the sensors).

P

Pixel:

Abbreviation for "picture element", a pixel is a small square of coloured light that forms a digital image. It is the smallest unit in a digital image. Think of a pixel as a single small tile in a large mosaic.

R

RAW:

A file format that contains the original metadata with no particular treatment. This data creates a sort of digital "negative" that must be converted into a standard format with the help of software.

Resolution:

Defines the number of points per inch. One could not say that the resolution characterizes an image, but rather its representation on a screen or a printer. Resolution also refers to the number of pixels a scanner can extract from a document.

S

Saturation:

The saturation expresses the purity of the colour, i.e. the absence of gray and intermediate tones. Technically, the degree to which a colour is undiluted by white light. On an everyday basis, the degree of colour intensity. A totally unsaturated colour photograph becomes monotone—or black and white.

Sensor:

A sensor is an electronic system that transforms light into electronic signals. These signals are then converted into digital values that reflect the intensity of colours for each point in the image.

Shutter:

The shutter blocks the passage of light traveling through the lens to the image sensor when it is closed, and allows light to reach it when it is open. Shutters are composed of blades, a curtain, a plate or another movable cover. They control the amount of time that light is allowed to pass through the opening to reach the image sensor.

T

TIFF (Tagged-Image File Format):

This is an image format that does not degrade the image (but will occupy more disk space du to its size). It is used for optimal image resolution.

Treatment :

Adjustments made to a digital photo to change its original aspect like saturation settings, brightness, contrast, colour ... Also called "post-production".

V

Vignette:

Vignetting is specific to zoom focal length and aperture: light is distributed unevenly and what results is a gradual reduction of the light at the edges of the image causing dark borders.

W

WB-auto (Automatic White Balance):

This is the automatic adjustment of the white balance, ie colourimetry depending on the light source.

White balance:

White balance is the way to correct the colour matching of an image based on the type of lighting to prevent an incorrect colourcast in the image.

Wide-angle:

A wide-angle is a lens used for short focal lengths (less than 40mm). The angle of vision is, as the name suggests, high.

Z

Zoom-Digital:

A digital zoom interpolates the central part of the image to simulate an optical zoom. The more one zooms in on the subject the more one loses in quality in the image.

Zoom-Optical:

An optical system composed of lenses that allow you to “zoom in” or “zoom out” on your photographic subject without changing your physical position or the definition of the captured image.

Learn more about the work of great photographers on these topics

1 Depth of field and sharpness

Stefan Vanfieteren for his portraits with minimum depth of field, Ansel Adams, Edward Weston and more from the "group F / 64" for landscapes and still lifes.

2 Blur, shake and stopped action

For blur, see: Bernard Plossu, Willy Ronis (for example:"Vendôme rain", 1947). For stopped action and movement: Cartier-Bresson and his famous "decisive moment" or "photographic shooting" (which defines the exact moment when the photographer presses the release button, and captures an image.) In fact, the photographer captures the image of a single scene, which will never be seen again in the same way.

3 Light and colour

Bruce Gilden (Flash), Martin Parr (very marked colour and circular flash) and Massimo Vitali for his famous overexposures.

THE PHOTO ACADEMY

Class booklet

Workshop 2

Depth of field

Tips & suggestions

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#1

THE LENS (FOCAL LENGTH)

The focal length is a constant of the lens. It is measured in millimeters and will give a type of vision obtained through the lens.

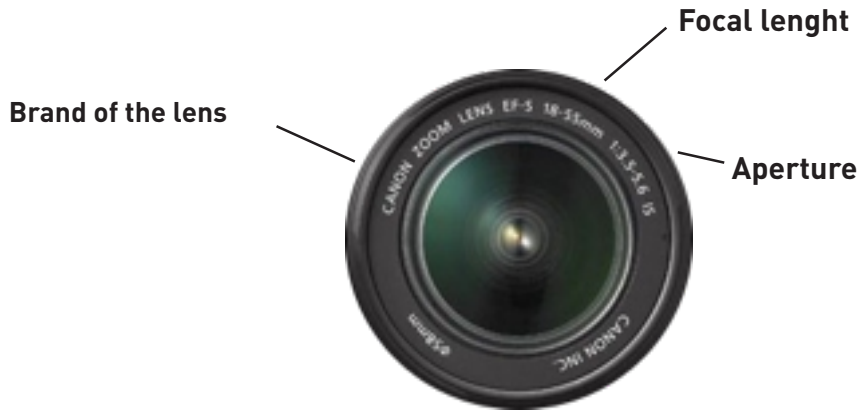
For example, the focal length that best corresponds to the human field of vision is the 50mm lens. Here we refer to this lens as a normal or a "standard" focal length.

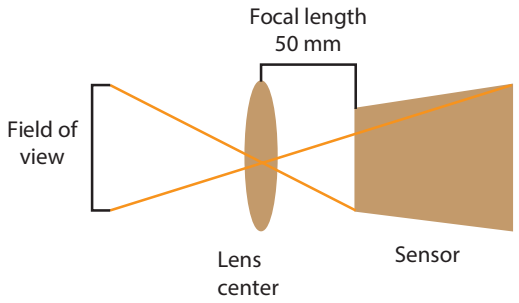
Different Focal Lengths

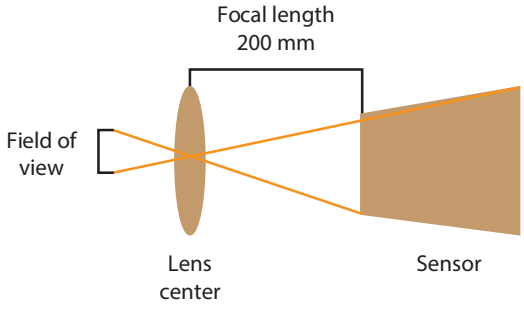
- **Wide-angle lenses**
  (14mm-35mm) are best used for landscapes, architecture or interiors

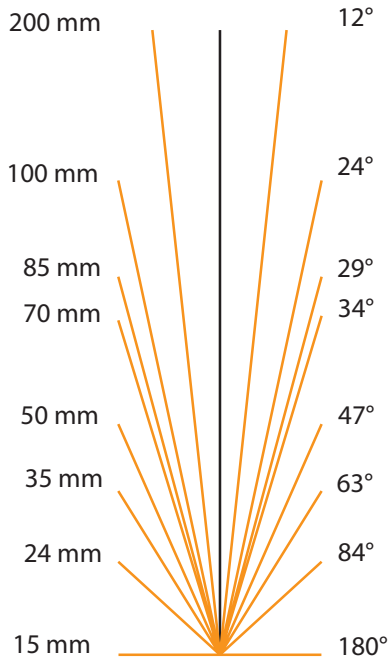
- **Standard lenses**
  (35mm-70mm) are the most commonly used

- **Long-focus or telephoto lenses**
  (85mm-300mm) are best adapted for subjects far away


Focal lenght
Brand of the lens
Aperture


Focal length
50 mm
Field of
view
Lens
center
Sensor

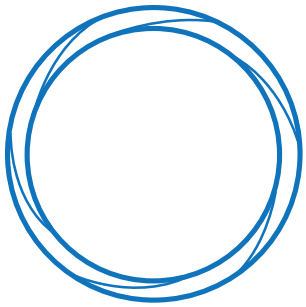

Focal length
200 mm
Field of
view
Lens
center
Sensor


200 mm
12°
100 mm
24°
85 mm
29°
70 mm
34°
50 mm
47°
35 mm
63°
24 mm
84°
15 mm
180°

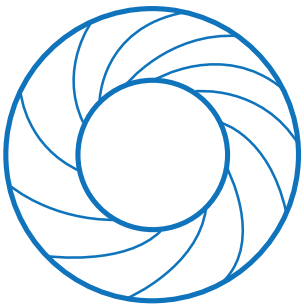

17 mm
24 mm
35 mm
50 mm
70 mm
100 mm
200 mm
300 mm
400 mm

#2

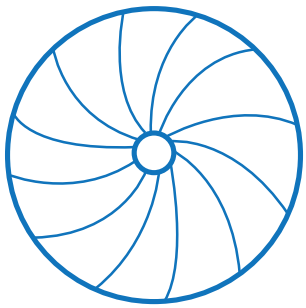
THE LENS (APERTURE)



Large aperture
f/1.4 - f/2.8

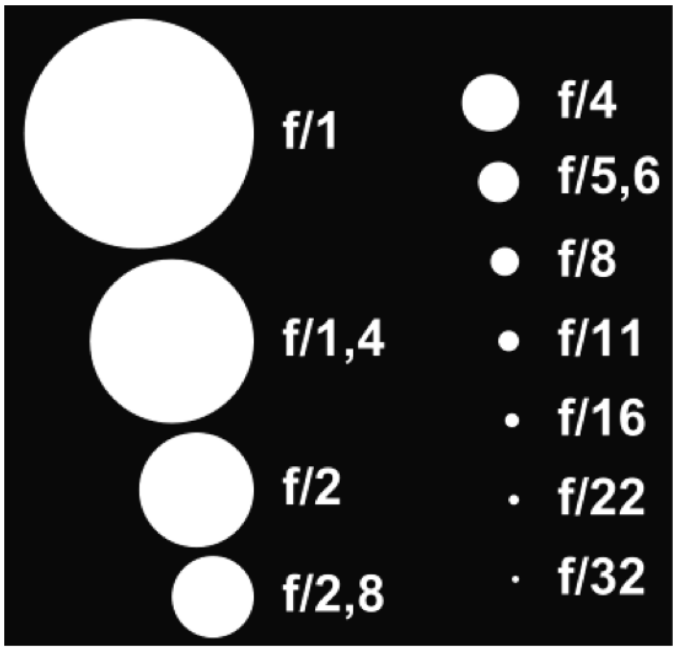


Medium aperture
f/4 - f/5.6



Small aperture
f/8 - f/11 - f/16

The f-stop corresponds to the aperture size of a lens. It expresses an amount of light that will be transmitted through the lens. The smaller the number, the more light that will reach the sensor. This f-stop is a ratio of the aperture diameter and the focal length; hence this value can be compared for all lenses. In other words, all lenses set at the same f-stop number transmit the same amount of light.



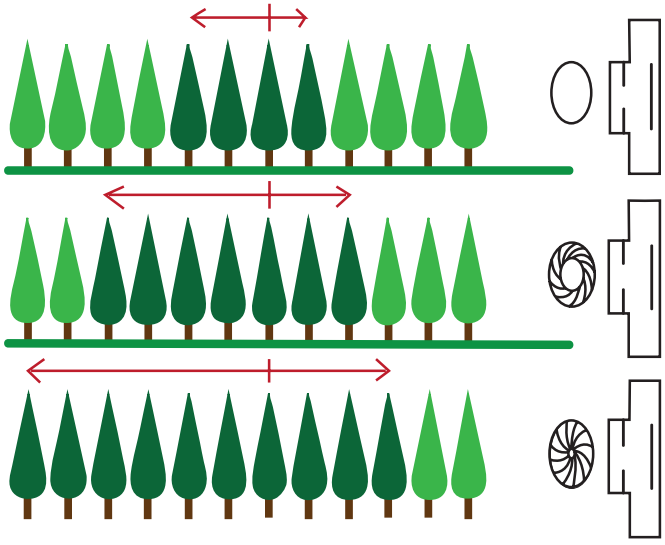
CAUTION: Do not confuse focal length and f-stop.

#3

DEPTH OF FIELD

The depth of field is the zone of sharpness in a photo. It is an essential element of artistic expression in photography: it can give a subject more importance than its surroundings or, allow you to capture all the details of an entire scene.

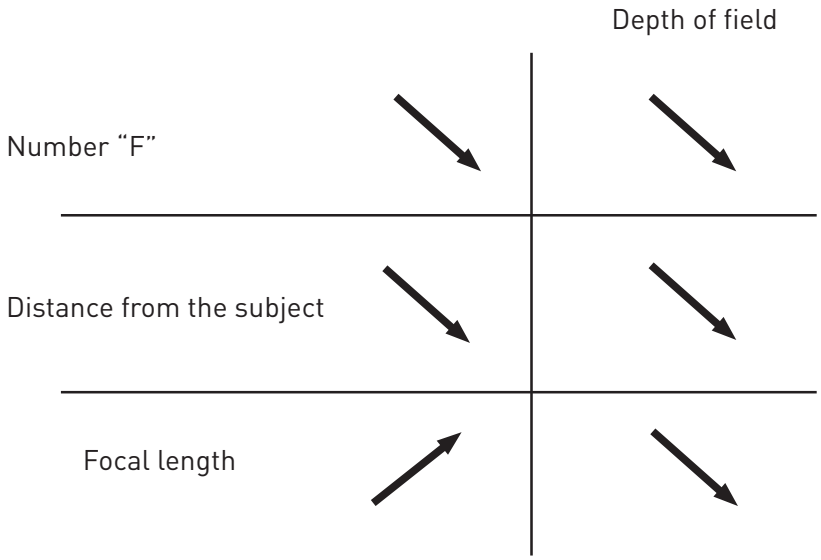
• When taking a picture, only one area can be in clear focus: the areas before and after the subject in focus can be more or less blurred.
• The depth of field in a photo is the area IN focus.



The depth of field depends on three parameters:

- The focal length of the lens
- The f-stop number
- The distance to the subject

Most in focus photo (large depth of field)	Photo with blurriest background possible (short depth of field)
Close the diaphragme (f/7, f/11,...)	Open the diaphragm (f/1.4, f/1.8, ...)
Use the short focal length (12mm, 24mm, ...)	Use a long focal length (85mm, 105mm, ...)
Focus far away (at least to the hyperfocal)	Be close to the focus zone



In summary:

• If you approach your subject either by zooming the lens (increase the focal length) or physically moving closer, the depth of field decreases.

• If you open the aperture - reducing the f-stop - the depth of field also decreases.

Notes

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Backlight:

When the light source is behind the subject.

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Cell:

A device for measuring the light to adjust the exposure of a camera.

Collimator:

The collimator shows the area of the image where the distance is set (in an autofocus system) for focusing. It may also be used for light measuring in case of "spot' measuring mode.

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Colour fringing that occurs when a lens does not focus different wavelengths (colours) of light equally. The results of chromatic aberration (green or purple generally) are most noticeable around the edges of high-contrast images, especially toward the edges of the frame. Chromatic aberration is most common on less expensive lenses, although even the best optics can occasionally display lower levels of chromatic aberration under certain conditions.

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A ring or plate with a hole in the centre, the size of which controls the amount of light entering the camera. An adjustable diaphragm enlarges or reduces the size of the hole, or aperture permitting more or less light to pass through the lens to the film or digital sensor.

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The proper exposure, which is best determined by the light-metering cell, can be established in a number of exposure modes including manual, program (automatic), shutter priority and aperture priority.

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The process by which you choose the best imagery for presentation or story telling.

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It is the distance between the focal point of a lens and the film plane when the lens is focused at infinity. It is used to designate the relative size and angle of view of a lens, expressed in millimeters (mm). A particular lens' focal length can generally be found engraved or printed on the front of the lens.

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The way an image is saved to a digital camera's memory. JPEG, TIFF and RAW (DNG or other proprietary le formats) are the most common formats found in digital cameras.

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The use of a flash during the day when facing the sun so as to balance the natural and artifcial light. This technique opens up the shadows.

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A graph that shows the distribution of the tones in a digital image, ranging from black (left) to white (right). A photographer can use a histogram to understand and manipulate exposure. Many digital cameras have the ability to show the photographer a histogram of an image he or she has taken. Most image editing applications can create a histogram for an image.

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ISO in digital photography represents the sensitivity of the electronic sensor that captures the image and is designated by a single, almost universally-accepted common rating system which uses the initials "ISO" before the digital camera's sensitivity setting number - e.g. ISO 100. The higher this value, the more sensitive the sensor is.

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A standard for compressing image data where the size of the file is reduced. JPEG, with its 16.7 million colours, is well suited to compressing photographic images. A "JPEG" image file name carries the extension "jpg" (e.g. "portrait.jpg"). Many people refer to an image in JPEG format as a "JPEG," pronounced "jay-peg".

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Kelvin:

A unit of temperature. In photography, it refers most often to the temperature of a colour. The visible light spectrum is scientifically described in terms of colour temperature, and is measured in degrees Kelvin (K).

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Lens:

A true "lens" is a single piece of glass (or other transparent substance) having one or more curved surfaces used in changing the convergence of light rays. What we commonly call a photographic lens is more accurately and technically called an "objective," an optical device containing a combination of lenses that receives light rays from an object and form an image on the focal plane. However, dictionaries have come to accept the usage of the term "lens" to mean the entire photographic objective itself. A photographic lens will always be called a lens, even though it is not a lens, but has a lot of lenses in it. A camera lens collects and focuses rays of light to form an image on a digital camera's sensor or a traditional camera's film.

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-High light: The most luminous zones in an image.

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Abbreviation for "picture element", a pixel is a small square of coloured light that forms a digital image. It is the smallest unit in a digital image. Think of a pixel as a single small tile in a large mosaic.

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RAW:

A file format that contains the original metadata with no particular treatment. This data creates a sort of digital "negative" that must be converted into a standard format with the help of software.

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Defines the number of points per inch. One could not say that the resolution characterizes an image, but rather its representation on a screen or a printer. Resolution also refers to the number of pixels a scanner can extract from a document.

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Saturation:

The saturation expresses the purity of the colour, i.e. the absence of gray and intermediate tones. Technically, the degree to which a colour is undiluted by white light. On an everyday basis, the degree of colour intensity. A totally unsaturated colour photograph becomes monotone or black and white.

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The shutter blocks the passage of light traveling through the lens to the image sensor when it is closed, and allows light to reach it when it is open. Shutters are composed of blades, a curtain, a plate or another movable cover. They control the amount of time that light is allowed to pass through the opening to reach the image sensor.

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Adjustments made to a digital photo to change its original aspect like saturation settings, brightness, contrast, colour ... Also called "post-production".

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Vignetting is specific to zoom focal length and aperture: light is distributed unevenly and what results is a gradual reduction of the light at the edges of the image causing dark borders.

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This is the automatic adjustment of the white balance, ie colourimetry depending on the light source.

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Zoom-Digital:

A digital zoom interpolates the central part of the image to simulate an optical zoom. The more one zooms in on the subject the more one loses in quality in the image.

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An optical system composed of lenses that allow you to "zoom in" or "zoom out" on your photographic subject without changing your physical position or the definition of the captured image.

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Stefan Vanfieteren for his portraits with minimum depth of field, Ansel Adams, Edward Weston and more from the "group F / 64" for landscapes and still lifes.

2 Blur, shake and stopped action

For blur, see: Bernard Plossu, Willy Ronis (e.g. "Vendome rain", 1947)
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Bruce Gilden (Flash), Martin Parr (very marked colour and circular flash) and Massimo Vitali for his famous overexposures.

THE PHOTO ACADEMY

Class booklet

Workshop 3

Shutter speed and mouvement

Tips & suggestions

1 Exercise your eye

We recommend you attend a maximum number of photo exhibits and consult the works of the masters of photography on a regular basis.
Exercising one's eye is one way to progress. It helps you recognize your tastes and helps the composition of your images as you move forward.

2 Continue

You will follow the photography initiation training for beginners. We think that you could enjoy the thematic courses as a logical follow-up to your training. You will be able to discover new, more thematic subjects such as composition, portrait, night photography or Lightroom software.

3 Discuss with others, get inspired

Try to **share your love of photography** throughout the year with other passionate image-makers. Photo festivals, conferences, and portfolio reviews can be good ways of **making connections and building your artistic network.**

#1

SHUTTER SPEED & MOVEMENT

Shutter speed is shown in fractions of a second in the following order:

1 - 1/2 - 1/4 - 1/8 - 1/15 - 1/30 - 1/60 - 1/125 - 1/250 - 1/500 - 1/1000...

Each shutter speed is twice as fast as the previous one.

We can roughly classify shutter speeds into:

- Long exposures:

1s - 1/2s - 1/4s - 1/8s - 1/15s

- Slow speed imagery:

1/30s - 1/60s

- Regular to fast speed imagery:

1/125s - 1/250s - 1/500s - 1/1000s - 1/2000s

The indicator B (Bulb) allows you to make long exposures where you control the number of seconds for your image.

The shutter speed (or exposure time) is given priority when you want the impression of movement or want to freeze an action.

If you want:

- An impression of movement or speed - use long or slow exposures.
- To freeze the action - use regular to fast exposures.

There is a connection between focal length and shutter speeds:

- For a blur-free photo, the speed value must be equal to or greater than the focal length of your lens. (e.g., for a 50 mm lens, use a speed equal to or greater than 1/50 second. Similarly, for a 300 mm lens you will need at least 1/250 s)
- The previous rule can be adjusted according to your poise or if your lens is equipped with a stabilizer that would allow you to gain a factor 2 on that shutter speed value.

Freezing motion

Pictures that freeze a movement put the focus on details such as the expression of a face, the precision of a gesture, the originality of a pose or when we want the subject to be sharp. In cases where you want the subject to be sharp and fixed, you should choose a fast shutter speed that directly correlates to the speed of the movement of the subject. Graphically speaking, shutter speeds of 1/30 s to 1/60 s are sufficient for a portrait of a person that moves little or slowly. A shutter speed of 1/250 s is best for a subject that moves faster (e.g. a cyclist going medium speed), and a shutter speed such as 1 / 1000s or 1 / 2000s is required to freeze fast moving subjects (e.g. a bird in flight or a race car).

#2

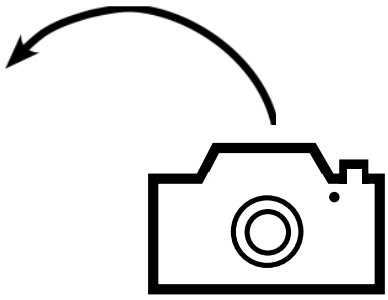
LONG EXPOSURE ON TRIPOD

Frequently used by landscape photographers, static yarn is characterized by a sharp background/scene and a blur of a moving element. For instance, the moving water of a river will be blurred and the mountain in the back will be sharp.

To get this result, it is best to use a tripod so as not to avoid the risk of moving the camera. This principle of mounting your camera on a tripod for long exposures is an expanding practice in the so called "light-painting" field, where lamps, lasers and other light sources are moved in front of the opened shutter of a camera set in long exposure.

#3

PANNING



Use slow shutter speeds (below 1/30 s), depending on the speed of the subject and the intensity of the desired effect.

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Workshop 4

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Tips & suggestions

1 Exercise your eye

We recommend you attend a maximum number of photo exhibits and consult the works of the masters of photography on a regular basis.
Exercising one's eye is one way to progress. It helps you recognize your tastes and helps the composition of your images as you move forward.

2 Continue

You will follow the photography initiation training for beginners. We think that you could enjoy the thematic courses as a logical follow-up to your training. You will be able to discover new, more thematic subjects such as composition, portrait, night photography or Lightroom software.

3 Discuss with others, get inspired

Try to **share your love of photography** throughout the year with other passionate image-makers. Photo festivals, conferences, and portfolio reviews can be good ways of **making connections and building your artistic network.**

#1

LIGHT

Mode of measurement	Situation	Measured zone
Matrix or evaluative	Landscape, portrait, low-contrast scene	The entire image
Spot	Portrait, back-lit, subject with different lighting than background	Only one collimator at or outside of the centre (about 5% of the image)
Central-weighted	When the centre of the image must be well exposed without knowing precisely where to measure with the Spot mode.	The entire image, but with the weight on the centre of the image
Selective (only Canon)	Similar to the Spot mode but without clearly knowing precisely where to measure the light.	Identical to Spot mode, but covering a larger zone (about 10 % of the image around the chosen target)


Matrix


Spot
(placed below the lamp shade)


Selective
(placed below the lamp shade)

Combinations of aperture settings, speed and ISO sensitivity can give the same exposure, for example the following 3 settings will produce the same image in terms of exposure – and histogram (according to the principle of the exposure triangle).

Setting 1	Setting 2	Setting 3
200 ISO	100 ISO	ISO 100
f/4	f/4	f/2.8
1/400 s	1/800 s	1/800 s

In other words:

From 1 to 2: if you double the ISO keeping your aperture constant, you will need to double the shutter speed from 1/400 s to 1/800 s to get the same exposure.

From 1 to 3: If you double the shutter speed keeping the ISO constant, you will need to double the amount of light reaching the sensor by opening the aperture and going from f/4 to f/2.8

From 2 to 3: If you divide the ISO value by 2 keeping a constant shutter speed, you will need to double the amount of light reaching the sensor by opening the aperture and go from f/4 to f/2.8

#2

MANUAL FOCUSING

Nowadays and despite the omnipotence of autofocus, manual focusing may still be necessary; too little light in the subject or lack of contrast can prevent the autofocus from focusing.

For manual focusing, the photographer can use:

- its viewfinder (but very tight on an APS-C)
- the distance graduation on the focus ring (on some lenses only)
- the digital zoom and live view (very precise solution, but requires stability)


1.2 1.5 2 3 5 ∞ m 40
4 5 7 10 20 ft
22 16 8 8 16 22

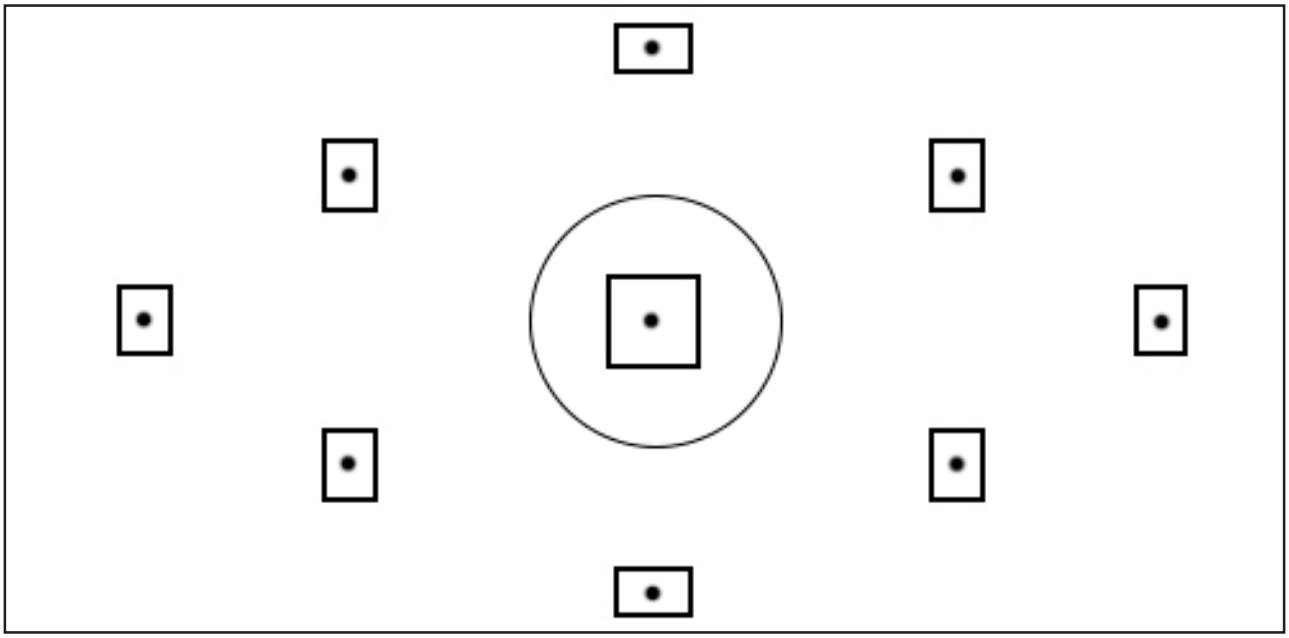
#3

AUTOFOCUS, HOW DOES IT WORK?

The autofocus system analyzes the contrast of the subject to be focused; knowing that the more blurred an element is, the less contrast it has, the autofocus adjusts its distance value until it achieves optimal contrast of the subject, and therefore its sharpest focus. The autofocus system therefore requires a sufficiently bright scene to be able to "see" and analyze the contrast of its subject.

The autofocus can focus at various points in the image (frame) by means of collimators, represented by small squares visible in the viewfinder, that are in fact the representation of the electronic cells used to make the autofocus. There are three types:

- Vertically oriented collimators
- Horizontally oriented collimators
- The cross/square collimators (they are placed in the centre of the frame and are the most efficient, as they adapt to all the orientations of the subject).



#4

DIFFERENT AUTOFOCUS MODES

Mode	How it works	Use cases	
OneShot / AF-S	It will focus when the shutter-release button is pressed. The focus is confirmed.	**Static subjects** (portrait, architecture,...)	Can be used with: - Only one collimator, which can be placed in the frame. - A group of collimators, which is possible to move within the frame. - All the collimators.
Servo / AF-C	It will continually adjust its focus according to the movement of the subject. This mode never confirms the focus.	**Subjects in motion (**football player, dancer, singer,...)	
Ai Focus / AF-A	It will automatically switch from OneShot/Af-S to Servo/AF- C mode if it detects movement of the subject.	**Static and mobile subjects**	

AF-S works most often, but when the subject is in a strong position and you have a shallow depth of field, the probability of missing focus in AF-S is such that you need to switch to Servo..

#5

MANUAL MODE

This mode of capture is indicated by the “M” pictogram.

It allows the adjustment of the three exposure factors (aperture, shutter speed and sensitivity).

A gauge tells us the future exposure of the scene, depending on the aperture, speed and sensitivity chosen.

This gauge can be found at various points of the camera: within the viewfinder, on the small upper control panel (on the expert and professional camera), and on the back of the camera.

Notes

GLOSSARY OF PHOTOGRAPHIC TERMS

A

Autofocus:

A system of sensors and motors that allow lenses to obtain focus automatically; in some cameras, the system also allows the lens to maintain focus on a moving subject.
Autofocus can be Continuous, meaning focus is maintained regardless of where it moves within the frame, or Single, meaning the point of focus is locked regardless of where the subject may move.

B

Backlight:

When the light source is behind the subject.

C

Cell:

A device for measuring the light to adjust the exposure of a camera.

Collimator:

The collimator shows the area of the image where the distance is set (in an autofocus system) for focusing. It may also be used for light measuring in case of "spot' measuring mode.

Chromatic Aberration:

Colour fringing that occurs when a lens does not focus different wavelengths (colours) of light equally. The results of chromatic aberration (green or purple generally) are most noticeable around the edges of high-contrast images, especially toward the edges of the frame. Chromatic aberration is most common on less expensive lenses, although even the best optics can occasionally display lower levels of chromatic aberration under certain conditions.

D

Depth of field:

The range of distance in a scene that appears to be in focus and will be reproduced as being acceptably sharp in an image. Depth of field is controlled in particular by the lens aperture, and extends for a distance in front of and behind the point on which the lens is focused.

Diaphragm or aperture:

A ring or plate with a hole in the centre, the size of which controls the amount of light entering the camera. An adjustable diaphragm enlarges or reduces the size of the hole, or aperture permitting more or less light to pass through the lens to the film or digital sensor.

E

EXIF (Exchangeable Image File):

Data produced by a digital camera that is attached to each image made by that camera (including information about the model of the camera, various settings, time stamping, etc).

Exposure:

It is the phenomenon of light striking the surface of film or digital imaging sensor. The exposure is determined by the quantity of light passing through the lens aperture (defined by the f-stop) combined with the duration of the exposure (shutter speed), hitting a sensor with a given sensibility (ISO).

The proper exposure, which is best determined by the light-metering cell, can be established in a number of exposure modes including manual, program (automatic), shutter priority and aperture priority.

Over-exposure: a prolonged exposure resulting in too much light that can 'wash out' or erase important image details. These "burned" zones of the images will show in pure white.

Underexposure: an inadequate exposure resulting in overly dark areas in the image.

Exposure Modes:

P - Programmed Auto: the camera sets the shutter speed and aperture for optimal exposure.

S or Tv - Shutter Priority / Time Value: User chooses the shutter speed; camera selects aperture for best results.

A or Av - Aperture Priority / Aperture Value : User chooses aperture; camera selects shutter speed for best results

M - Manual: User controls shutter speed, aperture and ISO.

Exposure time:

The exposure time is the time required for the digital sensor or film to be properly exposed.

Editing:

The process by which you choose the best imagery for presentation or story telling.

F

Focal length:

It is the distance between the focal point of a lens and the film plane when the lens is focused at infinity. It is used to designate the relative size and angle of view of a lens, expressed in millimeters (mm). A particular lens' focal length can generally be found engraved or printed on the front of the lens.

In 24x36 mm format a focal length of 50 mm is considered a normal lens, a focal length less than 40mm corresponds to a wide-angle lens while a focal value greater than 70mm is a telephoto lens.

Focus:

(1) A point at which converging rays of light meet after being refracted or reflected.

(2) The focal point of a lens.

(3) The clear and sharply defined condition of an image, as in " is image is in focus."

(4) The adjustment of the distance setting on a lens to obtain a sharply defined image, as in to focus a camera.

File format:

The way an image is saved to a digital camera's memory. JPEG, TIFF and RAW (DNG or other proprietary le formats) are the most common formats found in digital cameras.

Fill-in:

The use of a flash during the day when facing the sun so as to balance the natural and artifcial light. This technique opens up the shadows.

H

Histogram:

A graph that shows the distribution of the tones in a digital image, ranging from black (left) to white (right). A photographer can use a histogram to understand and manipulate exposure. Many digital cameras have the ability to show the photographer a histogram of an image he or she has taken. Most image editing applications can create a histogram for an image.

I

Image definition:

The definition of an image corresponds to the total amount of pixels within that image, obtained by multiplying the amount of horizontal pixels by the amount of vertical pixels. It is usually expressed in mega pixels or million of pixels. the definition will have an impact on the maximum size of print of a picture.

ISO:International Standards Organization (or ASA):

ISO in digital photography represents the sensitivity of the electronic sensor that captures the image and is designated by a single, almost universally-accepted common rating system which uses the initials "ISO" before the digital camera's sensitivity setting number - e.g. ISO 100. The higher this value, the more sensitive the sensor is.

J

JPEG:

Join Photographic Experts Group.
A standard for compressing image data where the size of the file is reduced. JPEG, with its 16.7 million colours, is well suited to compressing photographic images. A "JPEG" image file name carries the extension "jpg" (e.g. "portrait.jpg"). Many people refer to an image in JPEG format as a "JPEG," pronounced "jaypeg".

K

Kelvin:

A unit of temperature. In photography, it refers most often to the temperature of a colour. The visible light spectrum is scientifically described in terms of colour temperature, and is measured in degrees Kelvin (K).

L

Lens:

A true "lens" is a single piece of glass (or other transparent substance) having one or more curved surfaces used in changing the convergence of light rays. What we commonly call a photographic lens is more accurately and technically called an "objective," an optical device containing a combination of lenses that receives light rays from an object and form an image on the focal plane. However, dictionaries have come to accept the usage of the term "lens" to mean the entire photographic objective itself. A photographic lens will always be called a lens, even though it is not a lens, but has a lot of lenses in it. A camera lens collects and focuses rays of light to form an image on a digital camera's sensor or a traditional camera's film.

Light:

-High light: The most luminous zones in an image.

-Incident light: Light falling on a surface - not the light reflected from it. Incident light rays are those that strike an object.

-Low light: The darkest zones of light in an image. A low light zone can also be considered a shadow.

-Reflected light: The light reflected off a subject. The camera sensor and the film pick up on this light.

M

Mégapixel:

Refers to a million of pixels and is used in describing the number of pixels that a digital device's image sensor has. See "Image definition".

N

Noise:

Parasite pixels that distort a digital photograph. Superimposed pixels on the image can appear distributed in a regular or irregular fashion. The intensity depends on numerous factors (sensitivity, luminosity, temperature, the size of the sensors).

P

Pixel:

Abbreviation for "picture element", a pixel is a small square of coloured light that forms a digital image. It is the smallest unit in a digital image. Think of a pixel as a single small tile in a large mosaic.

R

RAW:

A file format that contains the original metadata with no particular treatment. This data creates a sort of digital "negative" that must be converted into a standard format with the help of software.

Resolution:

Defines the number of points per inch. One could not say that the resolution characterizes an image, but rather its representation on a screen or a printer. Resolution also refers to the number of pixels a scanner can extract from a document.

S

Saturation:

The saturation expresses the purity of the colour, i.e. the absence of gray and intermediate tones. Technically, the degree to which a colour is undiluted by white light. On an everyday basis, the degree of colour intensity. A totally unsaturated colour photograph becomes monotone—or black and white.

Sensor:

A sensor is an electronic system that transforms light into electronic signals. These signals are then converted into digital values that reflect the intensity of colours for each point in the image.

Shutter:

The shutter blocks the passage of light traveling through the lens to the image sensor when it is closed, and allows light to reach it when it is open. Shutters are composed of blades, a curtain, a plate or another movable cover. They control the amount of time that light is allowed to pass through the opening to reach the image sensor.

T

TIFF (Tagged-Image File Format):

This is an image format that does not degrade the image (but will occupy more disk space du to its size). It is used for optimal image resolution.

Treatment :

Adjustments made to a digital photo to change its original aspect like saturation settings, brightness, contrast, colour ... Also called "post-production".

V

Vignette:

Vignetting is specific to zoom focal length and aperture: light is distributed unevenly and what results is a gradual reduction of the light at the edges of the image causing dark borders.

W

WB-auto (Automatic White Balance):

This is the automatic adjustment of the white balance, ie colourimetry depending on the light source.

White balance:

White balance is the way to correct the colour matching of an image based on the type of lighting to prevent an incorrect colourcast in the image.

Wide-angle:

A wide-angle is a lens used for short focal lengths (less than 40mm). The angle of vision is, as the name suggests, high.

Z

Zoom-Digital:

A digital zoom interpolates the central part of the image to simulate an optical zoom. The more one zooms in on the subject the more one loses in quality in the image.

Zoom-Optical:

An optical system composed of lenses that allow you to "zoom in" or "zoom out" on your photographic subject without changing your physical position or the definition of the captured image.

Learn more about the work of great photographers on these topics:

1 Depth of field and sharpness

Stefan Vanfieteren for his portraits with minimum depth of field, Ansel Adams, Edward Weston and more from the "group F / 64" for landscapes and still lifes.

2 Blur, shake and stopped action

For blur, see: Bernard Plossu, Willy Ronis (e.g. "Vendome rain", 1947)
For stopped action and movement: Cartier-Bresson and his famous decisive moment (which defines the moment the photographer presses the release button and captures a defining image.

3 Light and colour

Bruce Gilden (Flash), Martin Parr (very marked colour and circular flash) and Massimo Vitali for his famous overexposures.

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