



# Basics of Video Camera, Light and Sound

## BA(JMC) 205

### Unit I

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## Syllabus- Unit 1

### [Introduction to Video Camera]

- Introduction to Video Camera, Parts and their Functions
- Types of Video Camera, Equipment and Accessories
- Broadcast Standards
- Lenses & Filters: Types and Functions
- Camera Control and Adjustment:
  - ✓ a. Aperture Control
  - ✓ b. Depth of Field
  - ✓ c. Depth of Focus
  - ✓ d. Focal Length
  - ✓ e. Aspect Ratio

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## Camera

- A camera is a piece of hardware that uses **photosensitive film** or a plate inside of a light-proof enclosure to take pictures. The **shutter of the camera opens and closes to expose the photosensitive film** to light, which then imprints the image onto the film.



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## The First Motion Picture

- The **Galloping Horse** is the first motion picture ever made
  - Eadweard Muybridge took a series of photographs of a rider on a galloping horse as a photographic experiment on June 15, 1878. The horse's name was Sallie Gardner, a Kentucky-bred mare, and Muybridge used multiple cameras to photograph her as she galloped past.

**First Video Camera**

- In 1956 the first video camera was made by **Ray Dolby, Charles Anderson** and **Charles Ginsberg**.



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## Video Camera

- The most obvious production element—**the camera**— comes in all sizes and configurations. Some cameras are so **small that they fit easily** into your **coat pocket**, whereas others are **so heavy that you must strain yourself to lift them onto a camera mount**.
- The camera mount enables the operator to move a heavy camera/lens/teleprompter assembly on the studio floor with relative ease.

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## Video Camera

- The studio television camera has three fundamental parts: the lens, the camera itself, and the viewfinder.
  - ✓ The lens picks part of the observable surroundings and creates a little optical image in every photograph (**meaning "writing with light"**).
  - ✓ The camera converts the lens's optical image into a video stream. The imaging device ( a **CCD chip**) is the main conversion element. The CCD generates a **powerful visual stream with a large amount of light**.
  - ✓ The **viewfinder** serves as a **compact television screen** affixed to the camera, enabling a real-time display of the camera's perspective. **Professional camera viewfinders commonly feature a monochromatic design**, presenting imagery in black and white. Conversely, numerous consumer-grade camcorders and select high-end studio cameras boast vibrant color viewfinders.

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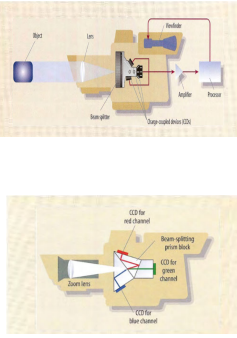
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## Parts of the Camera



- The **Beam Splitter**: A critical component in the realm of imaging devices.
- **Purpose**: It divides incoming white light into its fundamental RGB colors (Red, Green, and Blue).
- **Function**: Redirects each color beam to its designated CCD (Charge-Coupled Device) sensor for further processing.

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## Beam Splitter

- **Definition**: The beam splitter, also known as the prism block, is an optical device responsible for light separation.
- **Construction**: Typically, it consists of a high-quality glass prism or a specialized dichroic mirror.
- **Precise Calibration**: Ensuring accurate color separation is crucial for faithful image reproduction.
- **Importance of Color Separation**
  - **Color Accuracy**: Precise separation ensures **TRUE** representation of colors in the final image.
  - **Quality Output**: Maintaining **color dependability** enhances the overall image quality.
  - **Artistic Freedom**: Accurate color separation empowers photographers and artists to express their creativity.

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## External Parts Of Camera



Labels in diagram include: Top mounted 3.5" 16:9 swivelling LCD screen, Swivelling colour viewfinder switches off when top screen points forward, Mini DV tape loading compartment, Assign buttons, Auto / manual / hold switch, Iris, gain, shutter speed and white balance, Auto / manual focus switching, Two switchable neutral density filters, Independent gain control, Manual zoom ring with end stops, Manual aperture control, Zoom rocker / ring switch, Manual focus ring, 16:9 bayonet-on lens hood with integral double-doors lens cap, Leica T\* 12x zoom, f1.6 to f2.8, 4.5 mm to 54 mm, 72 mm filter thread, Built-in stereo microphone with override 1/8" stereo socket, Accessory shoe.

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**Cont..**

- **Body:** The body is the main portion of the camera, and bodies can be a number of different shapes and sizes. Studio **cameras** tend to be **larger-bodied** and a **bit heavier**, while other consumer cameras are conveniently smaller and can even fit into a pocket.
- **Image Sensor:** The image sensor converts the optical image to an electronic signal, which is then sent to your **memory card**.
- Two main types of image sensors are used in most digital cameras: **CMOS and CCD**. Both sensor forms accomplish the same task, but each has a different method of performance.



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**Lens:** The lens is one of the **most vital parts** of a camera. The light enters through the lens, and this is where the photo process begins.

- **Lenses** can be either **fixed permanently** to the body or interchangeable. They can also vary in **focal length, aperture**, and other details.

**Viewfinder:** The viewfinder can be found on all Video cameras and some models of digital compacts.

**Video Camera** will be the main visual source for **image-taking**, but many of today's digital compacts have replaced the typical viewfinder with an **LCD screen**.

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• **Memory Card:** The memory card stores all of the image information, and they range in **size and speed capacity**. The main types of memory cards available are **CF and SD cards**, and cameras vary on which type they require.



• **LCD Screen:** The **LCD screen** is found on the back of the body and can vary in size. On digital compact cameras, the **LCD** has typically begun to replace the viewfinder completely. On **Video Cameras**, the LCD is mainly for viewing photos after shooting, but some cameras do have a "live mode" as well.



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**User Controls:** The controls on each camera will vary depending on the model and type. Your basic **digital compacts** may only have auto settings that can be used for different environments, while a Video Camera will have numerous controls for auto and manual shooting along with custom settings.

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### Types of Video Camera

(On the basis of use)

Studio Camera	ENG Camera	Prosumer Camera
Sting Camera	Drone Camera	Infrared Camera
DSLR Camera	Spider Camera	Mobile Camera

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### Type of Video Camera

- Studio Cameras
  - ✓ The term studio camera is generally used to describe high - quality cameras, including high-definition television **(HDTV) cameras**. They are so heavy that they cannot be maneuvered properly without the aid of a pedestal or some other camera mount.
  - ✓ **Studio camera** as are **used for** various studio productions, such as **news, interviews, and panel shows**, and for **daily serial dramas, situation comedies, and instructional shows** that require high-quality video




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## ENG Cameras (Electronic News Gathering)

- ENG cameras are specifically designed for electronic news gathering and live reporting. Professional journalists and news crews use them to capture high-quality video footage quickly and efficiently. Key features of ENG cameras include:
  - Portability
  - Shoulder-Mount Design
  - Interchangeable Lenses
  - XLR Audio Inputs
  - Integrated Viewfinder
  - Zoom Control



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## EFP Cameras (Electronic Field Production)

- EFP cameras are similar to ENG cameras but are used for more controlled and planned video production, such as documentaries, corporate videos, and event coverage. They offer higher image quality and more customization options compared to ENG cameras. Key features of EFP cameras include:
  - Higher Image Quality
  - Interchangeable Lenses
  - Greater Customization
  - Modular Design
  - External Recording
  - Cine-Style Features



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## Consumer Camcorders

- ✓ Consumer camcorders are **portable video** recording tools for **common people** to record memories and videos.
- ✓ They are often easier to carry and utilise for several applications because they are **smaller and lighter** than professional camcorders.
- ✓ While standalone consumer camcorders are no longer necessary because of **smartphones' high-resolution cameras**, they still benefit those who want to make high-quality videos.

- Video Quality
- Optical Zoom
- Image Stabilization
- Audio Quality
- Storage
- Touchscreen and User Interface
- Built-in Wi-Fi and Connectivity

- Battery Life
- Compact Design
- Editing and Effects



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## Prosumer Camcorders

- ✓ Prosumer camcorders—short for "**professional-consumer**"—offer more advanced features and capabilities that **appeal to both amateur videographers and professionals** who need higher-quality video recording.
- ✓ These camcorders are between consumer-grade and professional-grade. They have superior image quality, settings, and audio than consumer models.

- Video Quality
- Manual Controls
- Interchangeable Lenses
- XLR Audio Inputs
- Image Sensors
- ND Filters

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## Other Camera

- **Spy Camera**
  - ✓ A spy camera, alternatively known as a **covert camera** or **hidden camera**, is a specialized device intended for the purpose of **secretly recording** video footage or capturing photos without the awareness or authorization of the individuals being observed.
  - ✓ These cameras are frequently employed for the objectives of surveillance, security, investigation
  - ✓ Spy cameras are available in a diverse range of forms and sizes, enabling them to be discreetly camouflaged among ordinary items or surroundings. Several prevalent instances of surveillance cameras comprise:
 

■ Button Cameras	■ Glasses Cameras
■ Clock Cameras	■ USB Charger Cameras
■ Pen Cameras	■ Book Cameras

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## Drone Camera

- Drones, unmanned aerial vehicles (UAVs), have cameras. Drones can fly autonomously or remotely. Drone cameras take photographs and films from unique aerial angles.

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**Drone Camera**

- ✓ **Types of Drones:** from small consumer drones to professional versions used for aerial photography, cinematography, surveillance, and more.
- ✓ **Camera Quality:** Drone camera quality depends on model and use. Professional drones frequently have 4K or higher-resolution cameras, whereas consumers may have lower-resolution cameras.
- ✓ **Live Video Streaming:** Some drones allow users to stream live video footage from the camera to a remote device, such as a smartphone or a tablet. This feature is helpful for real-time monitoring and recording.
- ✓ **Photography and Cinematography:** Drones equipped with high-quality cameras have revolutionized aerial photography and cinematography. They can capture stunning landscape shots, aerial views of events, cinematic sequences, and more.

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**Equipment and Accessories:**

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**Equipment and Accessories:**

- **Equipment and Accessories:**
- **Video camera:** A video camera is the **centerpiece** of your filmmaking gear package. The camera is **the most essential equipment** you need for making videos. Nowadays, cameras come in all sizes and shapes for any budget.
- **Tripod:** A necessary equipment to keep your footage looking steady and professional.



- **Microphone:** A microphone is a device that captures audio by converting **sound waves into an electrical signal**. This signal can be amplified as an analogue signal or converted to a digital signal, which a computer or other digital audio device can

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**Cont..**

- ✓ **Wireless microphone:** If shooting documentaries, training, live events, or even budget films, a wireless lapel microphone (another name for a **Lavalier mic**) is a great tool to have



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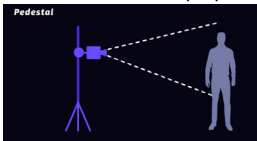
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- **Lights:** Sometimes, a nice pop of light from the camera can help fill ugly shadows. A camera light is a nice accessory to have, especially in a documentary/news style shoot where you might not have time for a full 3-point lighting set-up
- A **camera pedestal** is an item upon which television cameras are mounted, typically seen in television studios. Unlike tripods, **pedestals** give camera operators the ability to move the camera in any direction (**left, right, forward, back, up, down**). They are commonly used on shiny-floor shows, sitcoms and soap operas.



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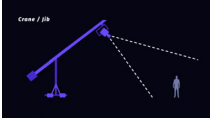
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**Crane Jib**

- In cinematography, a **jib** is any boom device that mounts a camera on one end and a counterweight with camera controls on the other. In principle, it **operates like a see-saw**, with the balance point located closer to the **counterweight**, which allows the end of the arm with the camera to move through an extended arc.



Typically, a **jib permits the camera to be moved vertically, horizontally**, or a combination of the two. A small jib can be **mounted on a tripod**, but many larger, **purpose-built jibs** have their own support stands, often on wheels. **Modern jibs** are normally modular and can be assembled in various lengths.

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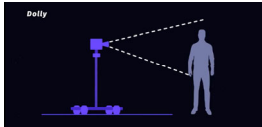


## Dolly

- A Dolly is a wheeled apparatus camera mounted at
  - The utilization of this particular technique has the potential to yield captivating and aesthetically pleasing footage, thereby augmenting the narrative and visual potency of a video.

Types of Camera Dollies

- Track Dolly
- Wheel Dolly
- Slider Dolly
- Tabletop Dolly



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## Cable Camera

- **Cable Cam** is a 'Point to Point' cable cam system. It 'flies' along a cable stretched between two anchor points. The anchor points can be fixed points like trees or other permanent structures or movable anchors like a forklift, scissor lift, scaffold or similar.



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## Camera Stabilizers

- Filmmakers and videographers use camera stabilizers to reduce or eliminate camera movement. They improve video quality and professionalism by doing so.
- Film, video, and photography use stabilizers. They stabilize photos in dynamic or shaky environments. Stable footage requires camera stabilizers. They mitigate camera tremors, vibrations, and unexpected motions.



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**Gimbal or other Steadicam:**  
A gimbal can be described as a pivoted point that allows you to **rotate an object along a single axis.**



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**Accessories**

• **Extra memory cards:** Make sure to get enough storage for your camera. Most new cameras shoot on **SD cards**. But more professional cameras and older models may shoot on **CF or other brand-specific cards.**



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**Accessories**

• Extra video production equipment (that you may need):

- ✓ **Lens Kit:** A kit lens is a "**starter**" lens which can be sold with an **interchangeable-lens** camera such as a single-lens reflex camera.
  - It is generally an inexpensive lens priced at the lowest end of the manufacturer's range, not to add much to a camera kit's price.
- ✓ **Boom pole:** A boom pole is simply a steel pole attached to your **Three-point Hitch (TPH)** and functions as a **small crane.**
  - While it cannot lift really high or a lot of weight compared to a crane, it can sure lift a lot more than you can.




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## Accessories

- **Portable digital audio recorder:**
  - ✓ Portable digital audio recorders are designed for many different uses. Some are geared specifically for musical recording artists; others are built for electronic news gathering in the field.
  - ✓ **Headphones:** Headphones let a single user listen to an audio source privately, in contrast to a loudspeaker, which emits sound into the open air for anyone nearby to hear.




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## Accessories

- ✓ **Light reflector & bounce card:** A light reflector can turn an ugly amateur-looking shot into a golden and gorgeously lit scene.
- ✓ **Extra batteries:** Having extra charged batteries is a good idea for any video shoot. We recommend having at least two backups, more if you're shooting a documentary in the middle of a jungle with no power source in sight.

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## •Broadcast Standards

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## Broadcast Standard

- The term "**broadcast standard**" pertains to a collection of **technical specifications and quality criteria** that must be met by content in order to be deemed appropriate for dissemination on television or radio networks.
- Broadcast standards involve a wide range of factors related to the **generation and transmission of material**, which include:

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## Broadcast Standard

- ✓ **Video Resolution and Format:** Broadcast standard video resolutions typically include **standard definition (SD)**, **high definition (HD)**, and sometimes **ultra-high definition (UHD) or 4K**. The **specific resolution** and **aspect ratio (e.g., 16:9)** are defined to ensure compatibility with broadcasting equipment and consumer displays.
- ✓ **Frame Rate:** Broadcast content often adheres to specific frame rates, such as **24, 25, 30, or 60 frames per second (fps)**. The choice of frame rate can affect the visual quality and the overall feel of the content.

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## Indian Broadcast Standard

- There are three main TV standards that exist worldwide:
- PAL (**Phase Alternation Line rate**),
- NTSC (**National Television Systems Committee**) and
- SECAM (**System Electronique Couleur avec Memoire**).
- PAL is extensively used in **Western Europe, parts of South America, Australia, India and China**. NTSC is used in **North America** and SECAM is the system prevalent in **Russia, Eastern Europe, some parts of Africa and France**

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## Indian Broadcast Standard

- **NTSC** : NTSC is an abbreviation for National Television Standards Committee, named for the group that originally developed the black & white and subsequently color television system that is used in the United States, Japan and many other countries. An NTSC picture is made up of 525 interlaced lines and is displayed at a rate of 29.97 frames per second. Example - All the countries using NTSC are currently in the process of conversion, or have already converted to the ATSC standard, or to DVB, ISDB, or DTMB.
- **PAL** : Phase Alternating Line (PAL) is a color encoding system for analog television, and was created in 1961 in the United Kingdom. It features 624 horizontal lines per frame with a rate of 25 frames per second. PAL is used in broadcast television systems in many countries and is one of the three major broadcast standards.

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## Indian Broadcast Standard

- **SECAM** : SECAM broadcasts 25 interlaced frames per second (50 half frames per second) at 625 lines of resolution, 576 of which are the image. Used in France, Russia, Africa, Eastern Europe and the Middle East, some of the countries have since switched from SECAM to PAL or from SECAM to digital TV

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## Lenses & Filters: Types and Functions

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## Lenses

- The lens determines what the camera can see. 
- ✓ One type of lens can provide a wide vista even though you may be relatively close to the scene
  - ✓ another type may provide a close view of an object that is quite far away.
- Different types of lenses also determine the basic visual perspective.

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## Types of Camera Lenses

- **Prime lens:** A prime lens is any lens with a set focal length. Therefore it cannot be “**zoomed**” in to transform the field of view of the lens. A lens with a set focal length of **50mm** is one example of a prime lens. You're unable to change the focal length of a prime lens. However, you are still able to adjust the focal distance of the lens via the focus ring.
- **Zoom lens:** A zoom lens is any lens with a variable focal length. It can be “**zoomed**” in to transform the focal length and, therefore, the field of view.

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## Types of Camera Lens Angles:

- **Standard lens:** A standard lens has a set (**prime**) **focal length** around the same length as the camera sensor or film gauge (measured diagonally). Standard lenses are purported to have a similar field of view to **the human eye**, though this has been disputed considering that the human eye has a true field of view closer to that of a **17mm to 25mm lens**, with a **f/3.2 aperture rating**.
- **Wide-angle lens:** A wide-angle lens is any lens with a set focal length shorter than the length of the sensor or film (measured diagonally). For a **full-frame sensor**, your **wide-angle focal length** would be anything below **35mm**.

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## Types of Camera Lens Angles:

- **Long-focus lens:** A long-focus lens is any lens with a set focal length significantly longer than the length of the sensor or film (measured diagonally). For a full-frame sensor, your focal length would be anything above **55mm**.

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## Extreme Types of Camera Lenses

- **Fish eye lens:** A fisheye lens is any lens with a set focal length that is significantly shorter than the length of the **sensor of the film** (measured diagonally). Often any lens with a focal length that falls between **22mm to 1mm** can be categorized as a fisheye lens.
- **Telephoto lens:** A telephoto lens has a special lens group built inside known as a telephoto group. This is because some lenses have a focal length that is greater than the physical length of the lens. An example of this could be a **500mm lens**, but it depends on the physical length of the lens.

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## Extreme Types of Camera Lenses

- Extreme Types of Camera Lenses
- **Macro lens:** A macro lens is a lens that reproduces an image on the sensor plane or film plane that is of similar size to that of the actual physical subject. Macro lenses are most often used to capture a very small subject, like an insect or a coin, in very fine detail.

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## Camera Control & Adjustment

- **UV and Skylight Filters**
  - Protective **UV and skylight filters** are often used to protect the front element of a lens against moisture, dirt, and scratches, which makes them ideal for shooting in wet, dusty, or muddy environments. In the past, **UV filters** were also used to prevent **UV light** from causing haze and fogginess in older photographic films, which were typically more sensitive to **UV rays**. On the other hand, skylight filters are every photographer's best friend when shooting under a clear blue sky.
  - They **can reduce the excessive blue** cast that often appears in photographs taken outdoors. They can also keep skin tones free of colour reflections from objects around the subject.

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## Polarizing Filters

- **Polarizing filters**, pretty much like sunglasses, add depth to an image by saturating its **colour and reducing reflections**. These filters have a rotating mount that's easy to attach to a lens.
- Once a **polarizing filter** is mounted on your lens and the subject is already framed, you can slowly rotate the filter while watching how the image changes on your camera's viewfinder or live view.
- Polarizers are best for shooting landscapes. They **darken skies and make colours pop**, as well as eliminate glare and reduce reflections on glassy or water surfaces.

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## Neutral Density Filters

- **Neutral density (ND)** filters are sheets of dark-coloured glasses that reduce the amount of light that enters your lens and hits the sensor, but without affecting the colour of the resulting image. This includes excess sunlight and powerful light from studio flashes.
- An ND filter doesn't need any adjustment at all, and you can still use the metering and focusing system of your camera and lens even with this filter attached to your lens. By reducing the intensity of incoming light, this filter allows you to shoot with slower shutter speeds without overexposing your image. In that case, if you're going to take a photo of a moving subject like flowing water, make sure to use a tripod for more dramatic motion blur and to ensure that everything else is tacked sharp. Most suitable for: Landscape photography, flash photography, street photography and photographing moving bodies of water like rivers and falls.

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 <b>Camera Lens Filter Overview</b>		
Lens Filter	Effect	Photography Type
UV & Skylight Filter	<ul style="list-style-type: none"> <li>Protects lens glass</li> <li>Shields old photography film from UV rays</li> </ul>	All
Polarizing Filter	<ul style="list-style-type: none"> <li>Reduces reflections and glare</li> <li>Enhances colors and contrast</li> <li>Reduces the amount of light entering the lens</li> </ul>	All
Neutral Density Filter	<ul style="list-style-type: none"> <li>Allows the use of slower shutter speeds and wider apertures</li> <li>Helps create motion blur</li> </ul>	Landscape and Flash Photography
Hard-Edge Graduated ND Filter	<ul style="list-style-type: none"> <li>Reduces the amount of light entering the lens through the top half of the filter</li> <li>Provides a sharp transition between dark and clear for flat horizons</li> <li>Balances exposure and high contrast between bright midday skies and dark foreground</li> </ul>	Landscape Photography

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 <b>Camera Lens Filter Overview</b>		
Lens Filter	Effect	Photography Type
Soft-Edge Graduated ND Filter	<ul style="list-style-type: none"> <li>Reduces the amount of light entering the lens through the top half of the filter</li> <li>Provides a smoother transition between dark and clear so use of filter is not evident</li> <li>Balances exposure and high contrast between bright midday skies and dark foreground</li> </ul>	Landscape Photography
Reverse Graduated ND Filter	<ul style="list-style-type: none"> <li>Reduces the amount of light entering the lens around the upper midline</li> <li>Provides a smooth transition from dark to less dark from the middle to the top edge</li> <li>Properly exposes the sun for clearer sunsets and sunrises</li> </ul>	Landscape Photography
Colored Filter	<ul style="list-style-type: none"> <li>Corrects colors for accurate white balance</li> <li>Enhances or blocks one type of color</li> </ul>	All

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 <b>Camera Lens Filter Overview</b>		
Lens Filter	Effect	Photography Type
Special Effects Filters	<ul style="list-style-type: none"> <li>Produces multi-point star sparkles</li> <li>Softens or diffuses edges for dream-like effect with sharp center</li> <li>Creates multiple copies of a subject or scene</li> <li>Blocks infrared light and passes visible light</li> <li>Customizes the shape of bokeh lights</li> </ul>	All
Reverse Graduated ND Filter	<ul style="list-style-type: none"> <li>Reduces the amount of light entering the lens around the upper midline</li> <li>Provides a smooth transition from dark to less dark from the middle to the top edge</li> <li>Properly exposes the sun for clearer sunsets and sunrises</li> </ul>	Landscape Photography
Colored Filter	<ul style="list-style-type: none"> <li>Corrects colors for accurate white balance</li> <li>Enhances or blocks one type of</li> </ul>	All

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**Camera Control and Adjustment:**

- ✓ a. Aperture Control
- ✓ b. Depth of Field
- ✓ c. Depth of Focus
- ✓ d. Focal Length
- ✓ e. Aspect Ratio

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## Aperture

- **Aperture:** The aperture affects the **image's exposure** by changing the **diameter of the lens opening**, which controls the **amount of light** reaching the image sensor. Some digital **compacts** will have a **fixed aperture lens**, but most of today's compact cameras have at least a small aperture range.
  - Aperture range will be expressed in **f/stops**. For Video Cameras, the lens will vary on **f/stop** limits, but it is usually easily defined by reading the side of the lens.
  - There will be a set of numbers stating the f/stop or f/stop range, ex: **f/2.8** or **f/3.5-5.6**. This will be your lowest settings available with that lens.

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## Aperture

**Aperture**

WIDE ← **APERTURE** → NARROW

Light floods in and less is in focus. Shallow depth of field occurs.

Light funnels in and more is in focus. Deeper depth of field occurs.

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## Depth of Field

- **Depth of Field:** Depth of field is that area of an image that is considered acceptably sharp, in other words it appears to be 'in focus'. That area of your picture that still appears to be sharp to your eye is called the "depth of field".
  - **The 3 Factors That Control DOF:** • the distance from the lens to the subject, • the f-stop being used, • and the focal length of the lens.
  - **2 types :**
    - **1. Shallow d.o.f. also called shallow focus** - where only a selected part of the image is in focus and the rest is blurry, creating circles of confusion.
    - **2. Deep d.o.f. also called deep focus** - where a large area of the image is in focus, from the foreground to the background.

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## Depth of field

- **Depth of field** is the area of acceptable sharpness in front of and behind the subject on which the lens is focused. Put simply; it refers to how blurry or sharp the area is around your subject.
- A **shallow depth of field** refers to a **small area in focus**. Often the subject is in focus, while the background is blurred. This is best for portraits, and one way to adjust this is with an aperture.
- A **deep depth of field** captures a **larger area in focus**, often keeping everything in the image sharp and clear. This is best for landscapes by using a large aperture.
- There are multiple ways to adjust the depth of field, including the aperture, the distance between the camera and the subject, the focal length of the lens, and even the size of the camera's sensor.

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## Cont...

**Shallow d.o.f**

**Deep d.o.f.**

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## Depth of Focus

- **Depth of focus:** Depth of focus is the image-space complement of the depth of field and is related to how the quality of focus changes on the sensor side of the lens as the sensor moves while the object remains in the same position. Depth of focus dictates how much tip and tilt can be tolerated between the image plane of the lens and the sensor plane itself. The lower **the f/#**, the more the depth of focus is reduced, and the more impact tilt has on achieving the best focus across the sensor.

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## Focal Length:

- **Focal Length:** It measures the distance, in millimetres, between the optical centre of the lens and the camera's sensor (or film plane). It is determined with **the camera focused on infinity**. Lenses are named by their focal length, and you can find this information on the **barrel of the lens**. For example, a **50 mm lens** has a focal length of **50 mm**. Focal length is a property of the lens itself, not the camera. What I mean by this is that a **50 mm lens** is a **50 mm lens**, regardless of whether on a full frame, cropped sensor, or medium format camera. However, the size of the sensor does play a role in the lens/camera combination's field of view, but more about this in a minute.

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## Aspect Ratio

- **Aspect Ratio:** For any given photo, aspect ratio describes the **proportional relationship** between your **image's width and height**.
- You can find aspect ratios that are commonly used in photography and film in many of the objects in the world around you. It is essential for technical and aesthetic reasons.
- An awareness of the characteristics of the **aspect ratio** of your particular camera can help you compose better images. It also helps you recognize when cropping to a different **aspect ratio** will improve the composition of your image.

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