

Camera Bodies

What am I looking for?

- **DSLR vs Mirrorless**

- DSLR (Digital Single-Lens Reflex) is the common terminology when considering larger cameras with interchangeable lens and refer to the function of how the camera “captures” the image.
- Mirrorless is the technological revolution to the DSLR and have seen a rapid increase in quality in recent years.
- DSLR still provide great quality but are often larger in size and cost. Mirrorless provide the cutting edge technology in cameras at lower prices with a wider variety entry level products to choose from .

- **Full Frame sensor vs APS-C “Crop” sensor**

- Full Frame cameras are the premium option among mirrorless cameras as the title is referring to the size of the electronic sensor that scans in the image when capturing photos and videos. Full Frame sensors mimic the size from 35 millimeter film.
- APS-C or Crop sensors are simply smaller but retain the quality from the larger sensors. The captured image is zoomed in compared to the Full Frame sensor.
- The lenses and camera bodies for APS-C sensors are significantly cheaper due to the reduced size. Full Frame are only necessary for professional users that require a more versatile field of view when considering the composition of pictures.

- **Sensor Resolution**

- Sensor Resolution, measured in megapixels (MP), refer to the amount of pixels in the camera sensor that receive light from the lens when capturing a photo or video.
- The higher number means that the sensor is more sensitive and captures more detail in the image, allowing for images to be cropped, zoomed in upon, or edited in post production.
- 24 MP sensors have become the industry standard for most professional videographers and provide the most when the settings are set to 4K video recording at 24 frames per second (FPS) which is the current standard for recording quality.

- **Bit recording**

- This refers to the amount of detail captured when video recording specifically. The higher number means higher detail.
- 8-bit is a widely accepted form across the cinematography community. 10-bit is the current standard among top mirrorless cameras.

- **File Format**

- Make sure the camera writes files to the memory card in a RAW format that is uncompressed in the menu options of the camera. While other options are acceptable (i.e. JPEG, etc.), uncompressed 10-bit RAW files retain the most amount of quality in recording.

Popular Brands

1. Sony
2. Panasonic
3. Canon

Recommendations

1. Sony ZV-E10 - \$700
2. Sony a6100 - \$800
3. Used Sony a6000 - \$345 (out of production but widely available)

Camera Lenses

What am I looking for?

- **Why use interchangeable lenses?**

- Interchangeable lens allow for the ability to constantly upgrade the quality of recordings. A camera body/sensor is only as good as the lens being used on it. *Cameras with a built in lens force a consumer to be stuck with a single product that becomes outdated in a single year due to the advancements in lens/glass technology.*
- Buying a separate lens and camera bodies ends up being a cheaper endeavor instead of having to upgrade the entire product every few years.

- **Focal Length**

- This is measured in millimeter (i.e. 35mm, 16mm) and refers to the length in between the glass elements inside the lens. The shorter length capture wider images (more background) while longer lengths capture “zoomed in” detail.
- It’s important to match the focal length with the photographer/videographer’s intention. Simply moving physically closer and further away with the camera in relation to the subject doesn’t maximize the quality of the shot and the possibility of the equipment being used.

- **Aperture**

- The aperture is measured in a unique term to cameras called “F-Stops” and refers to the metal blades inside the camera lens that adjust the amount of light that is passed through the lens to the sensor. This setting is often shown as f/1.8, f/2.8, f/4, etc. The number following refers to how “wide open” the blades inside the lens are. A wide open (f/1.2-5.5) F-Stop means the image will be brighter while a more closed F-Stop (f/6-22) will mean less light comes through.
- The most important part of the aperture is that the amount of light coming through the lens creates the a separation between the subject of the image and its background. If more light is passing through the lens (f/1.2-5.5), the area of focus in the image will be very small and most of the image will be a blurred background. Lower F-Stops allow the subject of the image to be in focus with the background as well. *This is one of the most influential decisions when considering an image’s composition and can strongly affect the artistic capabilities of the camera and lens that you are using.*

- **Prime vs. Zoom**

- A Prime Lens only has a single focal length and cannot zoom in or out from the set length. The lens tends to be extremely “sharp” showing a lot of detail. These are usually the highest quality lens that are available to buy.
- A Telephoto or Zoom lens uses a range of focal lengths (i.e. 18-35mm, 24-70mm) that allow for a zoom effect when changing between focal lengths. These lens contain more glass elements inside to accommodate the versatility of the lens. Because of this, the lens are heavier, more expensive, and lower image detail.

Popular Brands

1. Sigma
2. Sony
3. Tamron

Recommendation

1. Sigma 30mm f/1.4 DC DN - \$264
2. Sigma 16mm f/1.4 DC DN - \$374
3. Sigma 56mm f/1.4 DC DN - \$404

Camera Settings

Learning how to properly adjust a camera's recording options can maximize the quality of photo or video recording. It is paramount to *get your camera off of the "Auto" settings* and learn to properly control the camera and how it captures images. Utilizing these settings can make even cheap camera bodies and lenses capture professional level recordings.

Exposure Triangle

Each of these settings affect each of the other settings, so when adjusting one setting to achieve a certain outcome, it is important to also adjust the other two settings to have a balanced setting for the camera to record onto the sensor.

- Aperture
 - As mentioned in the Camera Lenses section (pg.2), the function is measured in "F-stops" and will display anywhere between f/0.8 to f/22 depending on the camera lens and body.
 - In addition to controlling the amount of light coming through the lens, this also creates the commonly seen "blurred" background often seen in movies or portrait photography. The higher the number of F-stop then the less background blur that would be created. For example, f/2.0 would be a very blurry background with a highly contrasting sharply focused subject in the picture while f/18 would include most of the frame in focus and there would be no blur in any of the picture.
- ISO
 - Refers to the sensitivity of the camera sensor and how bright a picture will look. Higher ISO (1,200-32,000) = Brighter images but lower quality while Lower ISO (50-1,000) = darker images but captures much more detail.
 - If a photo is taken with high ISO, there is the likelihood that "Image noise" will be included in the photo causing a grainy and undesired look. A general rule of thumb for this is to have the ISO as low as possible while still having proper exposure.
- Shutter Speed
 - Refers to how quickly a picture is captured and the motion blur that results from it. When recording video, it is best to follow the rule that the shutter speed should be double the recording frames per second (FPS). For example, if the FPS is 24fps (industry standard) the shutter speed should be set to 1/50 as well as 60 FPS = 1/120 shutter speed. *Since 24fps is the industry standard, shutter speed for video is often set to 1/50 as this setting gets the closest effect to the motion blur that the human eye observes.*
 - Shutter Speed is measured by its relation to a second. Therefore, the number is usually a fraction of a second referring to how long before the electronic shutter closes and records the picture (i.e. 1/125, 1/300).

Smaller Details

- Color Temperature - The tint (measured on the kelvin scale) which shows how yellow (lower number) or blue (higher number) the tint of a recording (i.e. 3500K = warmer or more yellow look, 5000K = cool or blue look)
- Picture Profiles - Determines how the camera records color, specifically highlights and shadows. This often determines the dynamic of the color spectrum can record. These are shown in file names such as HLG3, SLOG3, or CINE4.

Audio

While audio recording is another extended tangent that could be taken, we will respect it as a separate entity in its own. This section will primarily address the choice between utilizing the audio recording function internally in the camera body and external devices.

- **Internal Audio Recording**

- Cameras (excluding really high end “cinema” camera bodies) often utilize internal microphones as their basic option. The internal microphones are often low in quality and comparable to a mobile phone’s recording quality (i.e. iPhone voice memos).
- In addition, standard professional camera bodies have a female 1/8” port on their side found next to the micro-USB and micro-HDMI ports to plug in a single external microphone that can record a more “focused” audio. These microphones are often small diaphragm condenser microphones or more commonly shotgun microphones that are designed to clip on to the camera body.
- This is a more convenient and overall cheaper option, but gain control and other detailed controls are often hidden behind a confusing menu system that can be hard to control consistently.

- **External Recording**

- This is the typical form of recording that utilizes a separate device to capture audio and could include utilizing a DAW, audio interface, etc., in the recording process rather than only in post-processing.
- This process provides a higher detail in recording the audio but can be difficult to manage the recording system and camera simultaneously.
- Often, portable recorders will utilize XLR or 1/4” inserts in addition to an XY microphone attachment to add more microphones for a good option for audio recording in between internal recording and recording utilizing a computer and/or mixer.

Popular Brands

1. Rode (Internal)
2. Tascam (External)
3. Zoom (External)

Recommendation

1. Rode VideoMic GO II Camera-mount Lightweight Directional Microphone - \$99
2. Tascam DR-40X Four-Track Digital Audio Recorder and USB Audio Interface - \$200
3. Zoom H6 All Black Handy Recorder - \$350

Lighting

Why is it important?

Similar to audio, lighting techniques are another tangent to be taken when considering the quality of your video. Understanding and utilizing proper lighting will illuminate the areas around the subject to create focus in your recording. The most important concept to understand in this section is that how the human eye perceives a scene and how the camera sensor perceives are completely different and you must set up lighting to achieve the best results with your camera in mind.

Lighting Techniques

Basic Principles

The main function of lighting is to completely avoid shadows and properly illuminate the entire area being recorded by the camera. Shadows or dark areas to a camera sensor mean that the sensor isn't receiving enough information to process an image there and causes a grainy result that is often unpleasant to the eye. Proper shadows can be created by the use of varying levels of brightness in light. Therefore, a shadow in video to the human eye when filming often looks as just "less bright" light which can be adjusted in post processing to look more like a shadow, but having everything easily visible allows the camera sensor to capture everything in higher detail. This concept is especially important when dealing with cheaper cameras and sensors as they struggle to capture detail in low light situations. Each light should serve a purpose (face light, shadow/fill light, hair light, background light, etc.).

It is often best to not include the light source within the frame of the recording because it will often be much brighter than the actual intended subject. Including the lights can cause the subject to be less saturated in regard to the color spectrum or appear completely washed out and lose detail due to the light source adding more light than what the camera needs.

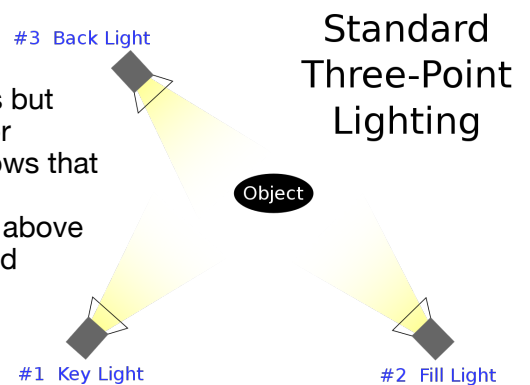
- **Hard Light vs. Soft lighting**

- Hard Lighting or unfiltered light is often very bright and white light (LED) that is high on the kelvin scale (6,000K-9,000K), which can cause a lot of shadows and the accentuation of angles among the subject. While hard lighting may look great when illuminating an instrument, it is often very unflattering to the human face.
- Soft Lighting is lighting that is less bright and more "yellow" (1000K-3500K) or simply diffused by a certain material. Running the light through a thin white sheet between the light source and subject could often diffuse the light enough to allow for the desired brightness but avoid the angles and shadows that can be created by Hard Light.

- **Three-Point Lighting**

- A single lighting technique among various others but often is the most malleable to a musician's uses when recording. The concept is the use of the three primary light sources that each serve a separate but cohesive function.

1. Key Light - This light is used for illuminating a person or object's face and is often the brightest light and utilizes a low temperature on the Kelvin scale (6,000K-9,000K)
2. Fill Light - This light is used to illuminate the opposite side of the subject from the fill light. This light should always match the Key Light's brightness but should never exceed it. It is often dimmer to allow for contrast in the subject and create the artificial shadows that can be adjusted in post processing.
3. Hair/Background Light - This light is often behind or above the subject to illuminate the outline of the subject and provide separation between the subject and its background.



Three Budgets

Cheapest Possible (\$1,487.32)

Video

- Sony ZV-E10 Mirrorless Camera - **\$698**
- Sigma 16mm f/1.4 DC DN Contemporary Lens for Sony E - **\$374**

Hardware

- Amazon Basics 50-inch Lightweight Camera Mount Tripod Stand - **\$14.34**
- Amazon Basics Aluminum Light Photography Tripod Stand with Case - Pack of 2 - **\$36.98**

Lighting

- Octagonal Softbox Lighting Kit, Photography Lighting Video Studio Light with 85W E27 3000-6500K Dimmable LED Light - **\$105**
- (2x) LUXCEO Handheld Photography Light Professional LED Video Light Wand - **\$160**

Audio

- Rode VideoMic GO II Ultracompact Analog/USB Camera-Mount Shotgun Microphone - **\$99**

Medium Budget (\$2,290.64)

Video

- Sony a6100 - **\$750**
- Sigma 16mm f/1.4 DC DN Contemporary Lens for Sony E - **\$374**
- Sigma 56mm f/1.4 DC DN Contemporary Lens for Sony E - **\$404**

Hardware

- (2x) Amazon Basics 50-inch Lightweight Camera Mount Tripod Stand With Bag - **\$28.68**
- (2x) Amazon Basics Aluminum Light Photography Tripod Stand with Case - Pack of 2 - **\$73.96**

Lighting

- MOUNTDOG Softbox Lighting Kit Photography Studio Light Photo Equipment with 3pcs - **\$99**
- (4x) LUXCEO Handheld Photography Light Professional LED Video Light Wand - **\$320**
- Neewer 43 Inch/110 Centimeter Light Reflector 5-in-1 Collapsible Multi-Disc with Bag - **\$41**

Audio

- Tascam DR-40X Four-Track Digital Audio Recorder and USB Audio Interface - **\$200**

Cost-Effective but Covering Every Base (\$4,178.62)

Video

- Sony a7C Mirrorless Camera - **\$1798**
- Sigma 24-70mm F2.8 DG DN Art for Sony E Lens - **\$1100**

Hardware

- (2x) Amazon Basics 50-inch Lightweight Camera Mount Tripod Stand With Bag - **\$28.68**
- (3x) Amazon Basics Aluminum Light Photography Tripod Stand with Case - Pack of 2 - **\$110.94**

Lighting

- MOUNTDOG Softbox Lighting Kit Photography Studio Light Photo Equipment with 3pcs - **\$99**
- (4x) LUXCEO Handheld Photography Light Professional LED Video Light Wand - **\$320**
- (2x) Neewer 43 Inch/110 Centimeter Light Reflector 5-in-1 Collapsible Multi-Disc with Bag - **\$82**
- (2x) GVM Great Video Maker 80W CRI97 spotlight - **\$240**

Audio

- Zoom H8 12-Track Portable Recorder - **\$400**