

Take only photos, leave only foot prints

Equipment

Camera

- Camera with ability for manual exposure (aperture, ISO, exposure time)
- Remove the strap or tie it down to prevent movement by wind (blurs long exposure images)

Tripod

- Sturdy tripod; ball-heads are more flexible than 3-way heads.
- Velcro strips are really useful to hold timer etc

Lenses

- Best range is below 100 mm full frame (70 mm crop sensor). Wide angles are often used.
- You will rarely zoom in, as lens motion is amplified.
- Important: bring your lens shade! It avoids flares from street lights.

Intervalometer or Timer

- Many exposures will be longer than 30 s, your camera's limit, must-have for star trails
- Intervalometers are more powerful than remote on/off control.

Flashlights (no head lights!)

- Bring a VERY DIM light (pen light on your key chain) for camera or lens adjustments
- Brighter or colored flashlights for light painting.
- Be considerate of others when using flashlights

Other stuff

- Hiking boots; Water, snacks; suitable clothing (it's cooler at night and you're standing around, not moving much); microfiber cloth, spare batteries (and charge them all!).

Camera Settings

- It's more difficult to see in the dark: Learn to use your controls blindly (less flashlight use!)
- Shoot RAW image format!!!! Much more latitude in recovering highlights and shadows
- Turn autofocus off, the camera can't focus well in the dark
- Turn auto-ISO off, we want to control the ISO setting.
- Turn VR/VC/OS off, it blurs images when on a tripod
- Turn off LENR = Long Exposure Noise Reduction (default: ON)
 - If you think you got a winner, turn it on for that one shot. Turn on for high ISO shots
 - We mostly shoot at low ISO, where noise is absent or controllable with software
- City lights require shutter speeds of 10-30 seconds, but with low ISO and small apertures, you can extend that to minutes. For that, set exposure time to BULB and use the intervalometer, remote control/timer.
- White balance: turn it to "K" (Kelvin temperature): 5500 is daylight, golden hour may be higher, at night white balance temperature drops gradually to 3450. Make it look natural!
- Set your LCD screen brightness to -2 to -3 (darker), it is too bright at night (makes photo look well exposed when it is underexposed).
- Image review: turn on blinkies (clipping) and RGB histograms (not just the white histogram)

Considerations

- You're not alone
 - Be considerate of residents, workers, fellow citizens and other photographers
 - Don't shine your lights around you, keep it spot on your equipment
 - Ask to make sure you don't ruin somebody's 8-minute light painting
- Your LCD shows up in other's shots: shade it with your body, turn it off, it drains the battery.

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- Your tripod is larger than you think!
 - Don't turn around and knock someone out
- You may be watched
 - Be friendly to people approaching you
 - Be **very** friendly to law enforcement (but know your rights, too!)
 - If in doubt, walk away, it's just a photo.
- Never leave your equipment out of sight! Keep camera bag under the tripod/on your back.

Exposure Settings

ISO

- No auto-ISO, we want to control it.
- Set camera to lowest native ISO (most common: 100, some Nikons are 200)
 - Exceptions: want longer exposure or even less noise: ISO 50
 - Not enough light, don't want to expose for 20 minutes: go up to ISO 200 or 400
 - Star dots and Milky Way: up to ISO 3200

Aperture

- Choose aperture for creative reasons
 - Shallow DOF: low f/-stop: 2.8-4
 - All in focus: high f/-stop: 11-16 (also gives you nice starbursts from lights)
 - Stars and startrails? Balance light and DOF: f/5.6-7.1

Exposure time / shutter speed

- With ISO set to lowest and aperture chosen for creative reasons, exposure time is defined
- All you need to do is figure out exactly how long you need to expose
- For star dots (no trails): 600/focal length (seconds); 400/fl for crop sensor cameras

High ISO Preview (be HIP, save time)

- Don't waste 4 minutes just to figure out that it wasn't enough or too much.
- Choose your aperture and don't change it.
- Set ISO 6 stops higher, which gives you exposure time 6 stops shorter
- Example: your native ISO is 100
 - 6 stops higher is: 100 → 200 → 400 → 800 → 1600 → 3200 → **6400**
 - An exposure time of 1 second at ISO 6400 is the same amount of light as 1 minute at ISO 100 (1" → 2" → 4" → 8" → 15" → 30" → 60")
 - With camera at ISO 6400, figure out how many seconds you need for the right exposure. Let's say you determined 3" exposure time at ISO 6400 is exposed all the way to the right.
 - Set your camera back to ISO 100 and the shutter speed to that number of minutes (in this example: 3 minutes).
- My camera's lowest ISO is 200!
 - 6 stops up: ISO 12800. 1" at 12800 is the same as 1 minute at ISO 200.
- My camera's lowest ISO is 50 (or: I want to shoot at ISO 50 for noise and longer time)
 - 6 stops up: ISO 3200. 1" at 3200 is the same as 1 minute at ISO 50.
- I changed my mind, instead of f/11, I want to shoot at f/8 (or f/16)
 - 11 to 8 is +1 stop of light (more light): select half the exposure time (double for f/16)

Practice this!! This should become second nature, especially if you go shoot outside the city into darker environments