Practical Police Photography Overview

Practical Police Photography was written as an inexpensive ebook for students and police officers who want to master the photographic skills expected of crime scene investigators employed by metropolitan police departments, regional crime labs, state law enforcement agencies and three letter federal agencies.

These skills revolve around advanced single lens reflex cameras, specifically the Canon 7D Mark ii and the Nikon D7000, D7100, D7200 and D500. These cameras have features that, to the best of my knowledge, are not shared with any other camera priced under $3,000 body only:

- Image quality sufficient to make good 20 x 30 enlargements.
- Optical eye level viewfinder.
- Good low light performance to ISO 6400 and beyond.
- Dual memory card slots for in-camera redundancy.
- Automatic distortion control.
- Compatible with legacy lenses that you may already own.
- Part of a comprehensive system including high output professional flash.
- ISO, shutter speed, aperture, exposure compensation and focus confirmation visible in the viewfinder.

You can certainly take good pictures with a smart phone, a point and shoot or an entry level DLSR camera in good light or within range of the built-in flash. I own and routinely use a Panasonic ZS9 pocket camera and a Canon G-15 compact camera when I don't need the full Nikon D7000 DSLR kit plus a tripod, a 1075 lumen flashlight and a 450 nm forensic light.

This book is geared towards DSLR camera users on the assumption that a student or a police officer obliged to use a smart phone or a point and shoot camera can successfully apply DSLR concepts and procedures within the limitations of his or her camera. The reverse is not necessarily true.

This overview includes the table of contents, three sample chapters and two practical exercises. The first exercise is based on the rather basic material presented in Section One. The second exercise is based on the advanced material presented in Sections Two through Six.
# Practical Police Photography

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Chapter 1.1
Introduction

Practical police photography occupies a useful but not always easy or inexpensive niche between the kind of photos that anyone might take with a simple snapshot camera and the more sophisticated photographs taken by scientists in a well-equipped forensic laboratory. Practitioners include:

- Forensic science and criminal justice students.
- Crime scene investigators required to take photographs as part of the overall crime scene processing protocol.
- Police officers and fire fighters who want to take their own photos for one reason or another, whether or not a formal requirement.
- Accident investigators, arson investigators, medical investigators, forensic pathologists, forensic nurses, forensic scientists, forensic engineers, evidence technicians, game wardens, private investigators and civilian security personnel.
- In short, anyone who needs photographs to document an investigation and support courtroom testimony.

There might not be much difference between photos of a typical daylight scene taken by a rank amateur with a $100 point and shoot camera and the same scene photographed by an expert with a $10,000 camera.

Factor in the difficult lighting conditions common to crime and accident scenes with the need for closeup photographs of fingerprints and trace evidence, throw in a requirement for the kind of large display prints that might be required for courtroom presentation, and the $100 camera might be found wanting while the $10,000 camera is probably overkill.
If you follow the procedures outlined in the following pages, you should be able to take photos that can be enlarged to at least 12 x 18 and perhaps even 24 x 36 inches, suitable for situations in which electronic presentation systems are either not available or not appropriate for the material being presented.

**Caveat Emptor**

This book will not teach you to become an expert photographer. That you will have to do for yourself by taking pictures under varied conditions and studying them with a critical eye to see how they can be improved. Use a camera like the camera that you expect to use on the job. You won't learn much taking pictures with a smart phone or a pocket point and shoot.

**Admissibility**

As a general rule, photographs are admissible if a credible witness can testify that they accurately depict the scene as it appeared when the photographs were taken but the devil is in the details. You need to understand the rules governing admissibility in your jurisdiction.

**Why Photography?**

- Photographs can capture details that were overlooked when the scene was originally processed.
- Photographs allow detectives, prosecutors, jurors and forensic experts to see the scene as it appeared to first responders.
- Some types of evidence are best presented photographically.
- Photographs are widely used as training aids and to document events ranging from riots to award ceremonies.
- Photographs are valuable in child abuse and domestic violence cases. By the time the case goes to trial, the victim's injuries will have healed and victims have been known to recant their original statements for reasons that defy explanation.

Hayden Baldwin, a heavy hitter in forensic circles, summed it up even more succinctly. We take photographs to show others what we have seen.
Don’t Laugh

This photo, purporting to be the long-abandoned Park County sheriff’s office in Hartsel, Colorado, is somebody’s idea of a joke. The real Park County sheriff's office occupies a modern facility in the town of Fairplay. Alas, the original Park County sheriff’s office constructed in 1873 now stands vacant.

The marshal's office in Green Mountain Falls is an active police station in 2016. The 1950 Plymouth is a coincidence. The marshal's car is a black Crown Vic that looks fast even when parked in the driveway.

You can see police stations this small and smaller throughout the American West. If your idea of law enforcement is based on what you see in New York, Chicago or Los Angeles, remember that you can drive one hundred miles between gas stations in some parts of the country without seeing so much as a starving buzzard.

Important Documents

Read and save the manuals and software that came with your camera, your flash and your computer. If the camera came to you without a manual, you can download a copy from the manufacturer's web site. An Internet search should turn up scanned copies of manuals long out of print.
Recommended Reading

The International Association for Identification (IAI) has stringent standards for certifying police photographers, crime scene investigators, fingerprint examiners and other forensic professionals. Their web site lists the books on which their certification tests are based.

IAI Police Photography Certification


IAI Crime Scene Investigator Certification

- *Crime Scene Photography* – Robinson and Witzke
- *Practical Crime Scene Processing and Investigation* - Gardner
- *Criminalistics: An Introduction To Forensic Science* - Saferstein
- *Crime Scene Investigation* - Fish, Miller and Braswell

To this list I would add:

- *Crime Scene and Evidence Photography 2nd Edition* - Steven Staggs
- *Advanced Crime Scene Photography 2nd Edition* - Christopher Duncan
- *Henry Lee's Crime Scene Handbook* - Dr. Henry Lee
- *An Introduction to Crime Scene Investigation* - Aric Dutelle
- *Kirk's Fire Investigations 7th Edition* - Dr. John DeHaan
- *NFPA 921, Guide for Fire and Explosion Investigations*
- *Traffic Collision Reconstruction 2nd Edition* - Lynn Fricke
- *O'Hara's Fundamentals of Criminal Investigation 8th Ed.* - D. Woods
- *Practical Shooting Scene Investigation* - Dean H. Garrison
- *Vehicular Accident Investigation and Reconstruction* - Donald Van Kirk

The Internet

The Internet is a valuable resource, starting with the web sites devoted to professional associations such as:

- International Association For Identification - [http://www.theiai.org](http://www.theiai.org)
For product reviews of general interest check out:

- http://www.dpreview.com
- http://www.imaging-resource.com

You should be familiar with the Scientific Workgroup publications listed at http://www.theiai.org/guidelines with one caveat. I haven't seen current Scientific Workgroup activity since the FBI stopped funding them a few years ago. Nevertheless, an attorney might present a SWGIT document as an example of best standard practice so it would behoove a prospective evidence photographer to be familiar with the contents.

Reality Check

I'd rather be a good investigator than a good photographer. Detective Manuel Fuentes of the Austin Police Department reports that intruders forced their way into a home where they bound and gagged the residents. The victims reported that a shot was fired but the initial reports made no mention of injuries or a recovered bullet.

Detective Fuentes visited the scene and found bullet fragments lodged beneath a near-invisible hole in the carpet. One of the intruders shot himself in the foot. DNA adhering to the bullet fragments lead to the apprehension of two perpetrators. Apparently, it did not occur to the folks who processed the original scene that, when a shot is fired, the bullet has to go somewhere.

IAI Certification Requirements

The International Association for Identification (IAI) is just one of several professional organizations certifying police officers and forensic
specialists in specific areas of expertise. IAI requirements and a reading list can be found at https://www.theiai.org/certifications.

- Forensic Photography Certification
- Forensic Video Certification
- Crime Scene Investigator Certification
- Crime Scene Analyst Certification
- Crime Scene Reconstructionist Certification
- Senior Crime Scene Analyst Certification
- Latent Print Certification
- Tenprint Certification
- Bloodstain Pattern Analyst Certification
- Footwear Certification
- Forensic Art Certification

ICSIA Certification Requirements

As Hayden Baldwin pointed out to me, Crime Scene Investigation is more of a skilled trade than a learned profession. You don't need a college degree to process a crime scene. You do need specialized training, the proper equipment and practical experience.

The International Crime Scene Investigators Association certifies people currently employed by a law enforcement agency with at least two years of experience as a working CSI. The program is not for forensic science and criminal justice students. However, you should know what ICSIA is looking for if you aspire to a career in crime scene investigation at the street level. (Laboratory work is often a different career path.)

The ICSIA certification program is, I'm told, the only certification program requiring both a written test and a demonstration of practical skills. Study the material to be found under the following links on the ICSIA home page, http://www.icsia.org.

- How To Become a CSI
- FCSI Training and Certification
- Advanced Crime Scene Processing Equipment List
- Crime Scene Photography Equipment List
FCSI stands for Forensic Crime Scene Investigator. Under the master link listed above, you will find additional links on the following subjects:

- Training
- Training Checklist
- Crime Scene and Vehicle Processing Protocols
- Certification Program
- Crime Scene Reminder Card (aka Checklist)

ICSIA's Recommended Reading List includes:

- Crime Scene Photography 2nd Edition
- Techniques of Crime Scene Investigation 8th Edition
- FBI Processing Guide for Developing Latent Prints
- Eagle Crime Scene Processing Video.

**EPIC Certification**

According to [http://www.evidencephotographers.com](http://www.evidencephotographers.com) on 3/13/2015, the Evidence Photographers International Council's certification program is hold due to economic conditions but their test specifications are instructive.

**Requisite Skills**

Police officers and students contemplating a career in law enforcement need to understand the legal issues associated with photographic evidence and have a solid understanding of what needs to be photographed at any scene they're likely to encounter.

If you anticipate photographing outdoor crime and accident scenes at night in bad weather to the satisfaction of demanding supervisors and prosecutors, you're going to have to master the advanced skills associated with digital single lens reflex cameras, heavy duty tripods, external flash units, forensic lighting and so forth, ad infinitum.

The skills required of a digital photographer working at the advanced level are no different from those of a film photographer in the days of yore. The basics haven't changed much since the Nikon F was introduced in 1959.
Purchasing On Line

If you can't find what you want locally, order on line. Make sure that you are purchasing items covered by the manufacturer's US warranty. Some dealers sell "gray market" merchandise without a US warranty.

- http://www.adorama.com - new and used
- http://www.bandh.com - new and used
- http://www.keh.com - used
- http://www.lensrentals.com - rental and used
- http://www.amazon.com - discontinued models at closeout prices

Spending my own money, I routinely buy used, factory reconditioned and closeout models as long as they are adequate for the intended purpose. Several of my current cameras and lenses were purchased from keh.com.

Reality Check

Some years ago, Hayden Baldwin, Illinois State Police Retired, discovered that the evidence submitted to the state crime lab by local police agencies was failing to meet the standards required for forensic examination. The problem? There was never any dialogue between criminalists at the state level and investigators at the local level.

More recently, Hayden reports that thirty-one of his CSI students in a Central American country are obliged to share eighteen cameras. In one instance, a CSI shot a homicide at ISO 3200 because a prior user had cranked up the ISO. This, along with lost or damaged equipment, seems to be a common problem when cameras are shared.

Eliot Springer, Deputy Director of the NYPD Crime Lab, speaking at an IAI seminar in 2014, reports that, "I've been doing it this way for years and nobody ever said anything," is a common excuse for slipshod work.

Forensic lighting specialist Robert Cheeseman relates that a student refused to move his camera off the P mode because his supervisor insisted that P stood for Police. If either the student or the supervisor had read the manual, they would have known that the P stands for Program.
Forensic pathologist Dr. Patrick Besant-Matthews reports that a student complained that supervisors would not let officers see their camera manual for fear that the manual would be lost. You would think that anyone competent to supervise police photographers would know that free manuals can be downloaded from the Internet. Alas, if only it were so.

A Texas prosecutor tells me that most of the photos submitted by police agencies in her jurisdiction are worthless because officers are given a P&S camera without giving them even rudimentary instructions.

Photography above the smart phone and point and shoot level is a technical endeavor. A smidgen of technical aptitude is essential.

Get your information from a reliable instructor or a mentor who actually knows what he or she is doing. Study the camera manual. If you're new to DSLR photography, buy one of the many books written by David Busch specific to the make and model of your camera.

Nikon's D7000 camera manual is 325 pages long with black and white illustrations. David Busch's *Nikon D7000 Guide to Digital SLR Photography* is 534 pages long with excellent color illustrations. I consider it thirty dollars well spent.

**Training**

Every college offers courses in photography and Photoshop in their fine art, commercial photography and journalism departments. These courses may be more advanced than the courses offered as part of a forensic science program.

Colleges with forensic science programs offer courses in evidence photography. Police departments, regional crime labs, professional associations and retired crime scene investigators offer the occasional workshop worthy of your consideration.

Regardless of where or how you get your training, learn how to download a new camera and flash manual from the manufacturer's web site and how to reset your camera back to the factory default if you inherit it from another user or are obliged to share it with other users.
The Fundamentals

*Practical Police Photography* concentrates on the advanced DSLR cameras used by professional photographers and photo-journalists because these are the cameras that you can expect to use if you work your way up to a CSI slot in a well-funded metropolitan police department, a regional crime lab, a state agency or one of the three-letter federal agencies. *If you understand the fundamentals of DSLR photography, you should be able to coax a good picture out of any camera.*

Skills acquired with a smart phone or a point and shoot will not suffice if you aspire to work above the first responder level. If you cannot borrow a DSLR loaner while building a useful skill set, you may be obliged to purchase a suitable camera.

Modern cameras have certain things in common including ISO, Focus, Shutter Speed, and Aperture. This is true of the Speed Graphic in production from 1912 to 1973, the Nikon F circa 1959 and the Canon 1Dx Mark II, $6,000 body only.
Chapter 1.2
On-Line Resources

Click HERE and HERE to see how things are done by the forensic imaging specialists working in the Westchester County crime lab. If you want to work at this level, you can expect to spend several years mastering the complexities of advanced DSLR cameras, the intricacies of processing felony crime scenes and the elephant in the corner, Photoshop.

Shooting with a manual camera and processing your film in a wet darkroom will take you back to basics. This is a hammer. This is a nail. Do not hit your thumb. If you hit your thumb, it will hurt.

Digital simplifies things by giving you the ability to check focus and exposure as soon as you take a picture. On the other hand, digital cameras are more complicated than film cameras, with more things to remember and a longer learning curve. The camera manual page count tells the tale:

- Nikon FM - 35 pages
- Nikon FE - 47 pages
- Nikon F100 - 57 pages
- Nikon F4 - 110 pages
- Nikon D70 - 207 pages
- Nikon D7000 - 327 pages
- Nikon D7100 - 355 pages
- Nikon D7200 - 416 pages
- Nikon D4s - 475 pages
- Nikon D810 - 505 pages
- Nikon D750 - 507 pages
Camera manuals don't tell you everything that you need to know but you can find plenty of free information on the Internet, including:

- **Crime-Scene-Investigator.Net** - Steven Staggs (Webmaster)
- **Evidence Collection Guide** - California DOJ (*Highly Recommended*)
- **Physical Evidence Handbook** - Wisconsin DOJ (*Highly Recommended*)
- **Crime Scene Investigation** - National Forensic Science Tech. Center
- **Photography in Criminal Investigations** - Charles C. Scott (1938)
- **How Big Can I Print** - Thom Hogan
- **Flash Photo Basics** - Wayne Fulton
- **How Light Meters Work** - Wayne Fulton
- **Photographs versus Reality** - Marc Green, PhD
- **Interpreting Photographic Evidence** - Marc Green, PhD
- **Influencing Juror Perspective** - Dennis Seley
- **The Ultimate Exposure Computer** - Fred Parker
- **Exposure Value** - Wikipedia
- **Processing Guide for Developing Latent Prints** - FBI
- **The Role of Medical Examiners in Law Enforcement** - J. Downs, M.D.
- **Effective Use of Courtroom Technology** - Federal Judicial Center
- **Digital Exposure Techniques** - Cambridge In Color
- **Understanding Histograms Part 1** - Cambridge In Color
- **Understanding Histograms Part II** - Cambridge In Color
- **A Photo-Journalist's Field Guide** - Stacy Pearsall
- **Understanding Video Jargon** - Michael Reichmann
- **Protecting Your Gear In Extreme Cold** - Adorama Learning Center

If you find manuals confusing, go to [http://www.camerasim.com](http://www.camerasim.com) and [http://dofsimulator.net/en](http://dofsimulator.net/en). These are interactive training aids.

Larry Barksdale teaching at the University of Nebraska directs his students to the following tutorials from [http://www.cambridgeincolor.com](http://www.cambridgeincolor.com):

- Understanding Digital Camera Sensors
- Understanding Camera Metering
- Understanding Depth of Field
- Understanding White Balance
- Understanding Auto-Focus
- Understanding Camera Exposure: Aperture, ISO and Shutter Speed
- Reducing Camera Shake with Hand-held Photos
- Understand Camera Lenses: Focal Length and Aperture
- Macro Lenses: Magnification, Depth of Field and Effective F/Stop
- Introduction to Macro Photography
- Flash Photography Part 1
- Flash Photography Part 2
- Introduction and Common Obstacles to Night Photography
- Camera Lens Flare: What It Is and How To Reduce It

The following links describe the requirements for the Crime Scene Investigation Certificate course at the University of California at Riverside. This is an advanced program for individuals who are already competent photographers with the equipment required to work above the point and shoot level.

- http://www.crime-scene-investigator.net/unexclass.html

Most of the advanced crime scene and accident investigation class outlines that I've run across assume that prospective students are already competent photographers with equipment similar to the hardware specified in unexclass.html. The instructor, Steven Staggs, lists videos available at http://www.youtube.com which cover much of the same ground found in the Cambridge in Color tutorials.

- Exposure: http://www.youtube.com/watch?v=fnVzXVsKdXU
- Freezing Motion: http://www.youtube.com/watch?v=x25oqCFXnjs
- TTL Metering: http://www.youtube.com/watch?v=B1H3WYkODWA
- Exposure Compensation: http://www.youtube.com/watch?v=-SjTTQ0UTyI
- Understanding Stops: http://www.youtube.com/watch?v=e7OwCh2Zpmk
- Shooting Manual: http://www.youtube.com/watch?v=MYvkbaIrQQ4
- Depth of Field: http://www.youtube.com/watch?v=95Igz6QM7Ag
- The Right Lens: http://www.youtube.com/watch?v=F5L6iINlvq8
- Know Your DSLR: http://www.youtube.com/watch?v=nZH8b5hffkA
- Histograms: http://www.youtube.com/watch?v=hNj-KRUztLY
- Aperture Values: http://www.youtube.com/watch?v=_pU_nRr2GGs
- Electronic Flash: http://www.youtube.com/watch?v=isJMu_khbs
- Inverse Square Law: http://www.youtube.com/watch?v=nk9cTa3UthM
- Using a Flash in the Sun: http://www.youtube.com/watch?v=zZQtEM4ZCZc
• **Night Shots**: [http://www.youtube.com/watch?v=LoPvsukrbR8](http://www.youtube.com/watch?v=LoPvsukrbR8)
• **Macro Basics**: [http://www.youtube.com/watch?v=gSi6pS4VFSE](http://www.youtube.com/watch?v=gSi6pS4VFSE)
• **Understanding RAW**: [http://www.youtube.com/watch?v=eBKYkEneJO4](http://www.youtube.com/watch?v=eBKYkEneJO4)

You don't need the latest professional camera with a stupefying price tag to process felony crime scene but you or your department will need to spend serious money if you want to work at the level required for ICSIA certification as a crime scene investigator or ACTAR certification as a Level IV traffic accident reconstructionist.

**ACTAR?**  **ACTAR** is the Accreditation Commission for Traffic Accident Reconstruction.

If all else fails, visit [http://www.steeletraining.com](http://www.steeletraining.com). Phil Steele has a number of free tutorials plus several inexpensive video tutorials. Steele's Event Photography, Lightroom and Photoshop courses can be help anyone sincere about working above the point and shoot level who doesn't have the time or the inclination to take college-level classes.

**Jargon**

Jargon is the language that specialists use to communicate with other specialists. I've been a photographer for fifty years but I was baffled when I started hearing the term "chimp." The term derives from the simian "ooh! ooh! ooh!" sounds made when someone views a good photo on a digital LCD display. You'll find a good glossary at [www.dpreview.com/glossary](http://www.dpreview.com/glossary).
Chapter 1.3
DSLR Reality Check

You can read until your eyes bleed but you'll never become a competent photographer until you go out and start taking pictures under operational conditions with the kind of camera that you can expect to use if you work your way up to a CSI slot at a metropolitan police department, a regional crime lab, a state agency or one of the federal agencies.

Almost without exception, this means an advanced DSLR with the expensive lenses and accessories associated therewith. By coincidence, the photographic equipment listed at http://www.icsia.org is almost identical with the equipment in my D7000 kit pictured in Chapter 3.1 or the equipment listed at http://www.crime-scene-investigator.net/fet-ol.html.

The ICSIA certification program is geared towards people currently employed as crime scene investigators. Steven Stagg's courses are slanted towards individuals attempting to qualify for a California Crime Scene Investigator's certificate. Both programs go well beyond what you might find in a basic evidence photography class.

Buying new, assembling a full kit will set you back the better part of $6,500. Buying used, the essentials can be had for around $2,000.

Two thousand dollars is serious money but your options are limited if you're trying to master the skills required to work at the advanced CSI level without a suitable camera. *In a perfect world, your school or department will furnish a loaner but world is far from a perfect place.* Here's how a basic kit priced out shopping on line at keh.com on March 8, 2016.
- Nikon D7000 Body, Like New (16 megapixels)  $449
- Nikon SB-800 Flash w/Diffuser, Like New  313
- Nikon 18 - 140 VR w/Caps & Hood, Like New  289
- Nikon 105 mm F/2.8 AF-D Macro, Like New  449
- Nikon SC-29 Off-Camera Flash Cord EX Condition  59
- Manfrotto 055 Tripod w/488RC2 Ball Head, Like New  305
- Case, memory cards, AA batteries, cleaning supplies, etc.  150
- **Total**  **$2,014**

KEH is not likely to have the exact products that you want in like new condition in stock at all times but be patient. New stuff comes in every day.

A D7000 body, an 18 - 140 lens, an SB-800 flash and an 055 tripod will yield professional results while teaching you more than you can learn with a smart phone or a point and shoot camera. Sixteen megapixels is good for 20 x 30 inch prints if your focus and exposure are spot on.

If you're bucks up and would prefer to buy new, a complete Nikon kit using B&H prices as of March 2016 would look something like this.

- Nikon D500 Body (20.9 megapixels)  $1,997
- Nikon 16 - 80 mm F/2.8 - 4 VR-G Lens w/HB-75 Hood  1,067
- Hoya 72 mm NXT-HMC UV Filter For Above  45
- Nikon SB-5000 Flash  597
- Nikon 105 mm F/2.8 VR-G Macro Lens w/HB-38 Hood  897
- Nikon 35 mm F/1.8 VR-G Lens w/HB-46 Hood  197
- Nikon 70 - 300 F/4.5 - 5.6 VR-G w/HB-36 Hood  497
- Nikon SC-29 Off-Camera Flash Cord  75
- Pelican 1520 Case w/Foam Insert  115
- Manfrotto MT055CXPRO4 Tripod w/054 Head  585
- Manfrotto Magic Arm Kit w/2nd Super Clamp  181
- Manfrotto E-705 Elements Cover (for flash)  70
- Memory cards, spare batteries, cleaning supplies, etc.  250
- **Total**  **$6,573**

The D500 is Nikon flagship APS-C camera. New at this writing, the high MSRP will probably come to around $1,750 later in the year. The comparable Canon is the EOS 7D Mark II. I'd be happy with either one.
- Canon 7D Mark II (20.2 megapixels) $1,499
- Canon 15 - 85 F/3.5 - 5.6 IS Lens 799
- Canon EW-78E Lens Hood for above 30
- Hoya 72 mm Filter for Above 45
- Canon 600 EX-RT Flash 549
- Canon 100 mm F2.8 L USM Macro w/Hood 849
- Canon 35 mm F/2 IS Lens 549
- Canon EW-72 Lens Hood for Above 45
- Canon 70 - 300 F/4 - 5.6 IS Lens 649
- Canon ET-65B Lens Hood for Above 38
- Canon OC-E3 Off-Camera Flash Cord 65
- Pelican 1520 Case w/Foam Insert 115
- Manfrotto MT055CXPRO4 Tripod w/054 Head 585
- Manfrotto Magic Arm Kit w/2nd Super Clamp 181
- Manfrotto E-705 Elements Cover (for flash) 70
- Memory cards, spare batteries, cleaning supplies, etc. 250
- **Total** $6,318

If you can't afford a D7000 with an 18 - 140 lens and an SB-800 flash, stick with your iPhone, a point and shoot or whatever you can borrow from your school or department. Perhaps your instructor will give you a pass on lab assignments that require shooting large outdoor scenes at night.

My primary DSLR camera is a Nikon D7000 with an 18 - 105 lens and an SB-800 flash. Since I have no reason to print larger than 20 x 30 inches, and my present lenses and flash are adequate for the intended purpose, I have no incentive to upgrade.

Sony, Panasonic, Fuji and Olympus make excellent mirrorless cameras but I have yet to see a newspaper photographer, a wedding photographer, a sports photographer or an advanced evidence photographer shooting with anything less than a DSLR from Canon or Nikon, if only because Canon and Nikon are the only companies making time-tested flash systems.

**The D500 and the 7D Mark II are top of the line APS-C cameras designed for news, sport, wildlife and event photography. Less expensive cameras will take pictures every bit as good at the expense of durability. You can easily spend $15,000 building a kit around either the Canon 1DX Mark II or the Nikon D5 full frame professional cameras.**
Useful Exercises (*Keep shooting until you get it right!*)

**Objective:** Learn the camera's capabilities. Learn to recognize various lighting conditions. Get a grip on flash. Get a handle on depth of field.

1. Enlist the aid of three volunteers to complete the exercise suggested on page 35. Shoot at base ISO aperture preferred, letting the camera adjust the shutter speed. Add a fourth volunteer at fifty feet or shoot against a detailed background such as a row of parked cars at fifty feet.

2. Select an object such as a parked car that isn't likely to move during the day. Shoot it at base ISO from the four points of the compass during the mid-morning, noon and mid-afternoon hours.

3. Select an interesting scene or structure. Using a tripod, photograph it during the late afternoon or early evening hours. Use the aperture preferred mode at as f/8. Take one shot at each full stop from ISO 100 to ISO 6400, letting the camera adjust the shutter speed.

4. On a clear night with a full moon, pick a scene illuminated only by moonlight. Use a tripod. Shoot manual using thirty seconds at f/8, taking one shot at each full stop from ISO 100 to ISO 6400.

5. On a dark night, select an imposing structure such as a church or a library that is not well-lighted. Set your camera on a tripod 100' from the entrance. Use manual flash at full power. Shooting manual at 1/60th of a second at f/5.6, take one shot at each full stop from ISO 100 to ISO 6400.

6. On a dark night, shoot an automobile inside and out right down the ashtrays and a simulated pistol under the driver's seat, with a recumbent volunteer in the back seat. Do whatever it takes to ensure that every photo is in sharp focus. You'll need an external flash. Use a diffusion dome for the vehicle interiors.

7. Shoot an outdoor sporting event to see how well your camera can follow action and freeze motion. If you don't have a nearby rodeo arena, look for an outdoor basketball court. Wait for action under the net, someone dribbling the length of the court, or someone shooting free throws.

*Print one daylight and one night photo at 12 x 18 inches. Costco can do it for $3.99 you wait. Photography is like shooting. You've got to put rounds downrange to prove that you can hit the target. Photographic enlargements are indisputable proof that you did hit the target.*
Objective: Demonstrate your mastery of skills related to processing a felony crime scene using equipment comparable to the equipment listed in Chapter 1.3. In addition to a macro lens, you'll need a 450 nm forensic flashlight, Tiffen #15 filters to fit your macro and your zoom, a 25' wide blade tape measure and a Bureau L-scale.

1. At night, photograph a well-detailed shoe print using oblique light. Fill the frame to preserve maximum detail. Use a Bureau L-scale.
2. Photograph the sole of the shoe that made the print. Use oblique lighting with a scale in the plane of best focus.
3. Photograph the full length of a tire track in sections, with a wide-blade tape measure in each photo to show how the sections overlap.
4. Photograph the entire circumference of the tire that made the track off the car, paying particular attention to any blemishes or wear patterns that might distinguish this tire from other, similar tires.
5. Take detailed photographs of a broken automotive lamp filament. You can scrounge suitable examples from your local garage. Try to match the quality of the examples on page 200.
6. Photograph a shiny quarter stuck to the wall at eye level. Use a macro lens. Use double-sided tape. Fill the frame. Use oblique lighting to control reflections and bring out fine detail.
7. Photograph a fingerprint, rolled or dusted, at 1,000 pixels per inch. Light as required to control reflections and bring out maximum detail.
8. Photograph a fingerprint at 1,000 PPI dusted with ultraviolet powder using a 450 nm light source, orange glasses and a Tiffen 15 filter.
9. Do a nocturnal housekeeping patrol in your home or dormitory using a 450 nm light source, orange glasses and a Tiffen 15 filter. Shoot anything and everything emitting UV fluorescence. Don't forget the dirty clothes hamper and the area around the toilets.
10. At night, photograph the exterior and the interior of a residence, model home preferred, showing the surrounding area, a nearby street sign, interior and exterior walls, objects on floor and walls, et cetera.
11. Have one room set up as a mock homicide scene with a volunteer "body." Use colorful children's Band-Aids to simulate wounds. Shoot the "body" from every angle including overhead. Get full face
and profile views, plus closeups of jewelry, tattoos, identifying marks or scars and any simulated weapons found near the "body."

12. Shoot a standing volunteer full length front, side and back views.

13. Get head and shoulders shots of your volunteer full face, left profile and right profile. Have the subject remove his or her glasses if they cause reflections. Use a portrait focal length such as 80 mm on an APS-C camera to avoid perspective distortion.

14. Create a blood spatter test pattern on the largest sheet of foam core or white cardboard that you can find using a squirt bottle of red fabric paint. Prop it against a wall. Take properly scaled glare- and distortion-free photos with the camera perpendicular to the target.

15. Same as above on the floor, showing a pool of simulated blood and drip stains, drip trails and forward spatter patterns as described HERE. The trick is to get properly scaled near-overhead shots without stepping in the paint, a no-no if you're shooting real bloodstains.

Print several daylight and several night photos at 12 x 18 inches and your one best photo at 20 x 30 inches. Costco can do it for $9.99 you wait. Photography is like shooting. You've got to put rounds downrange to prove that you can hit the target. Photographic enlargements are proof that you did hit the target.

I'm just the guy who wrote the book. Your instructor may be using another book or have different ideas. To make college-level training available to the widest possible audience, many courses are taught on line with homework assignments submitted electronically.

In that event, I suggest having these enlargements made for yourself just so you'll know what your camera and lenses are capable of. Photos downsize for electronic distribution and display may not contain all of the detail visible in high quality photographic enlargements printed at 300 dots per inch at full camera-original resolution.

If you can make tack-sharp 12 x 18 prints and 20 x 30 enlargements that will look good on an easel in front of the jury box, you've proven that you can work above the electronic snapshot level.