

Digital Cameras and Accessories

This document has been prepared for CVA students, to assist in purchasing a digital camera and accessories. While no specific product recommendations are stated, this document is intended to help students understand the current state of available technology. In the interest of brevity, this document is not intended to answer every possible question, or make all possible comparisons. Rather, this is intended to help students be informed shoppers.

Students are encouraged to ask questions as they shop, test and compare products.

A number of reference websites are listed in the document, and for convenience repeated on the last page. Many practical considerations are noted throughout the document. Specific questions and comments about this document can be directed to carol@cva.edu.

Digital Camera Shopping Summary

CVA Photography Instructor John Marshall offers this short summary as students consider purchasing a digital camera:

1. Do not buy an expensive many megapixel camera unless you have specific plans to make large prints.
2. Stick to the major brands (Canon, Nikon, Sony, Olympus, Fuji, Minolta) and avoid "great deals" on off brand stuff.
3. Unless you're completely strapped go for a 3-4 megapixel camera (now down to under \$200).
4. Buy a good sized memory card to augment the usually tiny one that will ship with a new camera.
5. Buy two sets of batteries so one is always available when the other is charging. if your camera uses standard batteries (AA, AAA, etc.) buy the NiMH & a charger, not only rechargeable but will last MUCH longer than alkalines (only for emergencies)
6. Ignore "digital zoom" stats (totally meaningless), pay attention to "optical zoom", look for a zoom slightly wide angle to slightly long (35–80mm range, 35mm format equivalent).
7. Video capability is great fun but not up to serious work, do not make a choice of camera based on its video capability.
8. The ergonomic factor is very important, how does a camera handle, is it easy to adjust, does it fit your hands, will it allow you to concentrate on the image and not on fiddling with controls all the time. The websites below usually do a great job of addressing this and other critical issues.

How to Buy a Digital Camera

INTRODUCTION

Digital photography keeps getting better: Higher resolution, more sophisticated controls, and better technology make getting great pictures easier than ever.

The Big Picture

MEGAPIXELS still matter most to digital camera shoppers, mainly because that specification remains one of the cameras' most important features, but also because manufacturers and retailers hype that specification above all others. If you're having a hard time figuring out which camera to buy, you may be tempted to make a decision based solely on megapixel count; that's why nearly all manufacturers print the number on the front of their cameras.

But a camera needs more than just a high pixel count to take great pictures, so pay attention to other traits as well. For example, a lethargic camera that takes too much time between shots may miss the best action, and a big, heavy camera may spend more time on the shelf than in your carry-on bag. A camera with no manual controls may take fabulous shots in bright sunlight, but lousy ones in more challenging situations.

Key Features

RESOLUTION: If you intend to take pictures only to e-mail them to distant friends or to print at snapshot size, a camera of most any resolution will do. Even so, more pixels give you greater flexibility—you can print sharper pictures at larger sizes, or crop and print small sections of pictures. Rules of thumb:

- A 2-megapixel camera can usually produce a pretty 5-by-7 print;
- a 3-megapixel camera, an 8-by-10;
- A 4-megapixel (or greater) model, an 11-by-17.

SIZE, WEIGHT, AND DESIGN: To some users, how much a camera weighs and whether it fits in a pocket may be more important factors than resolution. *PC World* has tested cameras that weigh as much as 2.6 pounds and as little as 4.1 ounces. Small cameras are convenient, but they frequently have tiny dials and buttons that make changing settings somewhat trying.

ZOOM LENS: Inexpensive cameras often lack optical zoom lenses. If we had to choose between a camera with an optical zoom and one with higher resolution, we'd take the camera with a zoom—it means you won't have to magnify your subject and then use software to crop the image (and discard some of that resolution as a result).

A few cameras now offer zoom ratings of up to 10X. These lenses are great for nature or sports photography, but you may need a steady hand or a tripod to avoid blurry pictures at extreme telephoto lengths.

BE WARY OF ADVERTISED ZOOM RATINGS—many vendors combine the **optical zoom** (which moves the lens to magnify the subject) with **digital zoom**, which merely captures fewer pixels and magnifies those. Optical zoom gives you all the benefit of the camera's maximum resolution, combined with the ability to get closer to the action.

MANUAL FOCUS: For close-ups or situations in which the camera can't get a focus lock, switching to manual focusing can help you get the shot. Low-end cameras often omit manual focusing or allow only stepped focusing, which only allows you to choose from a few preset distances.

STORAGE: At its highest resolution, a typical 2-megapixel camera can store eight to ten images on an 8MB "starter" memory card. The size of the memory card a camera ships with isn't terribly important, because you'll almost always have to buy another one (unless you're willing to transfer your images after every handful of shots).

CompactFlash, Secure Digital Cards, and SmartMedia cards cost about \$35 for 64MB, or \$50 for 128MB. Sony still makes cameras that store images on floppy disks or CD-R discs. Floppy storage is slow, however, and the disks can't hold more than one or two high-resolution images; compact discs store many more images, but the cameras that use them are slow and bulky.

BATTERIES: Cameras use one or more of several types of batteries: AAs, either non-rechargeable alkaline (\$5 for four) or rechargeable nickel metal hydride (NiMH, about \$14 for four); high-capacity disposable CRV3s (around \$12 apiece, and some cameras take two CRV3s); or proprietary rechargeable batteries that can cost \$35 to \$75 to replace.

MOVIES AND SOUND: Many cameras can capture video as well as still shots, though typical-size memory cards don't hold much video footage; the option is useful for short clips when you don't have a camcorder. **[technical note: the video clips that most digital cameras create are only screen resolution, so a digital camera is no substitute for true video if that is what you ultimately want].**

EXPOSURE SETTINGS: All digital cameras let you shoot in fully automatic mode—just press the shutter release and you get a picture. Better cameras offer aperture- and shutter-priority modes, in which you adjust the size of the lens opening or how long the shutter stays open, and the camera automatically controls the other variable to give you the proper exposure.

Typically, you'd use aperture priority to maintain control over an image's depth of field—for example, to blur the background of a shot while keeping the foreground sharp—and shutter-priority mode, for example, to capture fast-moving subjects. A camera that relies exclusively on full auto would attempt to keep both the foreground and background in focus in the former example, and it would probably blur the moving subject in the latter.

Usually, cameras that offer priority modes (such as digital SLRs) also offer full-manual exposure control, in which you set both variables. These modes make a camera adaptable to almost any situation.

MENUS: When evaluating a camera, consider how easily you can reach common settings—resolution, macro mode, flash, and exposure adjustments—and how easily you can play back just-taken images. Too many buttons, and you waste time trying to figure out which button does what; too many menus, and you waste time digging through them.

WHITE BALANCE: Almost all digital cameras allow you to choose a white-balance setting via presets. This setting tells the camera which elements in a shot should look white and, by inference, what should look black and what everything in between should look like. If you're finicky about color accuracy, look for a manual calibrator in which you press a button while aiming at a white object.

LCD: Low-end models often omit an LCD screen, which is necessary for reviewing just-taken images on the camera. A good LCD is essential for knowing whether you got the shot you wanted, and can usually give you an indication of whether it was properly exposed. LCD quality varies widely: Many wash out in sunlight or become grainy in low light, or the image may change if you tilt the camera slightly. If you can, try a camera outside before you buy it.

The Specs Explained

The table below offers a comparison of the kinds of features you typically find at different price ranges.

A digital camera's megapixel count remains its most important spec—but it is by no means the only one. Start with pixels, but make sure to check a few other important numbers when considering a purchase.

A camera's megapixel rating is another way of expressing its resolution. **The higher the megapixel number, the higher the resolution.** In general, higher-resolution cameras let you produce larger, higher-quality prints. A 2-megapixel camera can produce images of about 1600 by 1200 pixels, allowing for high-quality 5-by-7 prints. A 3-megapixel camera can produce images of about 2048 by 1536 pixels, allowing for crisp 8-by-10 prints.¹ The trade-off is that higher-resolution images take up more space on your camera's memory card, so you may only be able to take a small number of shots before you have to download them to your computer. The solution, of course, is to purchase a larger-capacity memory card.

So if you're interested in producing mostly small snapshots or images to send via e-mail or post on the Web, you probably don't need anything better than a 2-megapixel camera. If you want to create large copies of your masterworks, you'll want a camera that captures 4 megapixels or more.

¹ See resolution article.

FEATURE	LOW END (\$50–\$200)	RECOMMENDED (\$200–\$500)	HIGH END (\$500 and up)
BATTERY LIFE	Fewer than 200 shots AN IMPORTANT CONSIDERATION. Digital cameras quickly drain batteries—especially alkaline batteries—which can be expensive and annoying. Battery life and cost often aren't related; some cheap cameras have great battery life, and some expensive ones use up a charge quickly. Either way, it's a good idea to buy spares.	200–400 shots	More than 400 shots
MEGAPIXELS (RESOLUTION)	2 MEGAPIXELS OR LESS AN IMPORTANT CONSIDERATION. This figure provides a measure of how much fine detail a camera can capture. With more megapixels, you can print larger photos with better image quality.	3 TO 4 MEGAPIXELS	4 TO 6 MEGAPIXELS OR MORE
EXPOSURE CONTROLS	NONE (full-auto only) SOMEWHAT IMPORTANT. These controls allow you to customize exposure settings such as lens opening and shutter speed, which serious photographers will value.	SOME PROGRAM MODES (aka scene modes)	APERTURE & SHUTTER PRIORITY AND FULL MANUAL CONTROL
FOCAL RANGE	FIXED OR DIGITAL ZOOM SOMEWHAT IMPORTANT. Cameras with greater focal range can zoom out to fit more into a shot or zoom in to fill the frame with the subject. Optical zoom produces sharper images than digital zoom.	2X TO 3X OPTICAL ZOOM	4X OPTICAL ZOOM OR BETTER
MANUAL FOCUS OVERRIDE	NO SOMEWHAT IMPORTANT. This allows you to focus the camera yourself, which can be more accurate than automatic focus in some situations. Cameras with stepped focus can only be set to focus at a few predetermined distances.	STEPPED FOCUS	YES
STORAGE CAPACITY	32MB OR LESS SOMEWHAT IMPORTANT. Amount of data, in megabytes, the camera can store in on-board memory, removable memory cards, or both. How many photos you can store depends on the resolution at which you shoot them. But with most cameras, you'll almost certainly need to buy an extra card, so don't base your purchasing decision entirely on the starter card supplied with the camera.	32MB TO 128MB	256MB OR MORE

Digital Camera Shopping Tips

Before you head to the store, check out our advice for making a smart digital camera choice.

Ready to buy a digital camera? Here are *PC World's* recommendations:

- * Match megapixels to your use. A 2-megapixel camera is fine for snapshots, though models with that resolution are becoming less common. If you want to produce 8-by-10-inch prints, you'll need at least a 3-megapixel camera. Four- or 5-megapixel cameras will yield even larger prints and allow you to blow up a part of an image with less likelihood that the print will be blurry.
- * Look for rechargeable batteries and a charger. The cost of disposable batteries adds up over the long run. Some cameras can use AA batteries of any type--disposable or rechargeable. That capability can be helpful if your rechargeable batteries run out of juice and you don't want to wait while they replenish.
- * Get at least 2X optical zoom. Nearly all cameras offer digital zoom, but it results in photos that aren't nearly as good as those produced with an optical zoom.
- * Look for a low-light focusing aid. Some cameras have auxiliary lights that help them focus in dim settings. That's important for many indoor shots.
- * Make sure you can use removable storage media. While the camera may have on-board memory, a memory card allows you to expand the storage capacity.
- * Avoid cameras that use floppy disks or compact discs. Floppy disks are inexpensive, but they won't hold many images, and the cameras that use them typically take relatively low-resolution photos. Cameras that use compact discs are typically bulky and slow.
- * Try the camera before you buy. Some cameras have commands and menus that are easier to use than others, a comparison you can only make with a hands-on trial. Also evaluate the lag time between when you press the shutter button and when the camera actually takes the picture. Try out the zoom lens--does it operate quickly and smoothly? Find out how long you must wait between taking pictures. And try the LCD viewfinder--in the sun if possible--to determine how easy it is to read.
- * Give extra consideration to a camera with image-editing software. Look for useful packages like Adobe Photoshop Elements and Ulead PhotoImpact.
- * Insist on a camera with an LCD display. It allows you to review your photos on the spot--and delete the ones where your cousin kept blinking when the flash went off.
- * Don't base your decision on video capability. Any still camera's ability to take moving pictures is extremely limited. If you want to shoot video, invest in a camera dedicated to the job.
- * Consider investing in a memory card reader. These readers act like an external hard drive attached to your PC or laptop, allowing you to download pictures directly from the storage media your camera uses. Many newer laptops have one or more memory card slots built right in. That saves time downloading images, and since the camera doesn't have to be on, saves battery life, too.

Source: PC World June 26, 2005 <http://www.pcworld.com/howto/bguides/0,guid,12,page,3,00.asp>

Additional Tips on Cameras and their Use

BATTERY LIFE Factor in whether or not the camera HAS a rechargeable battery (Most Sonys and some Olympus do). IF NOT, does the camera require a special battery, or can it take standard sizes? Factor in the cost of either an extra battery (if the camera requires a special size) or a set of rechargeables. (MONSTER brand was developed standard sizes specifically for digital cameras. They hold a charge longer than other brands).

READ the directions on properly charging your battery. IF you do not FULLY charge the battery as specified the FIRST TIME, you may never get as much charge on it.

Turning your camera ON and OFF, and ZOOMING a lot really drains the battery quickly, as does lots of reviewing images. If your camera has the option for you to TURN OFF the LED screen, and you can view through a view finder when focusing, you save battery life.

BEWARE of cameras with BUILT-IN batteries. This means you must PLUG the camera in to recharge, this means you have NO option on a second battery so when you are out shooting pictures, when you run out of battery power, you are done for the moment!

MEDIA CHIPS Plan to buy in **AT LEAST** one additional media chip when you purchase your camera. They are often on sale at a variety of places, so you may not purchase these at the time you purchase the camera, but options are available.

MOST cameras are PC-formatted. If you are primarily interacting with a Macintosh computer, completely transfer photos and REFORMAT the media chip IN THE CAMERA between EACH USE. If you never reformat the media, you may find that periodically you LOSE all the files stored on your media. YOUR MEDIA IS your film.

NEVER try to format the media chip from a Macintosh computer UNLESS your manufacturer specifically directs.

For downloading images, most camera manufacturers provide a cable for directly connecting to your computers USB port.

CVA's computers labs provide media readers for the the most common types of camera media (See list at end of this document). **Check to be sure your camera is using a readily available form of digital storage media.**

THE 'NEGATIVE' FACTOR If you are shooting digital, your negatives ARE your digital files. SAVE the 'raw' out of the camera files to CD immediately. ALWAYS work on a copy of the original files.

DIGITAL vs. OPTICAL ZOOM – what IS the difference?

Optical Zoom means your digital camera has the ability with its lens to zoom in closer on a subject. This is done completely within the lens works in the same manner that non-digital cameras have always functioned.

Digital Zoom is what you do when you have an image on a screen meaning you can zoom in on part of it. When you are using digital zoom, you are NOT focusing in on an object, you are just looking at the pixels at a larger scale. Think of it this way, when you zoom in on an image on screen, you DO NOT make that image larger; you are just looking more closely at a part of that image. Know that Digital Zoom will not be focused AS CLEARLY as Optical Zoom. Look for a camera that can SHOW you when you are using digital versus optical zoom. Avoid excessive use of optical zoom.

Look at the zoom capacity of a camera when purchasing. Go to a camera store and ASK questions if in doubt. More expensive cameras are now offering additional lens options (most notably Nikon and Canon). BE AWARE that you MUST have a lens that syncs with the digital works, so old lenses may not work with a newer digital camera.

MEGAPIXELS & RESOLUTION — What does it really mean?

MegaPixels tell PART of the story. Megapixels measure how much data is collected when you take a picture.

More megapixels means bigger files, which in turn means that you need more storage space (on digital media) for those files.

Resolution is the MEASURE of pixels PER INCH. IT VARIES depending on what you want to do with your image.

Screen resolution is about FOUR TIMES LOWER than print resolution.

Screen and hence web space is 72 pixels per inch.

Appropriate print resolution is approximately 300 pixels per inch.

THIS MEANS in plain English that what you see on the screen is NOT a good indicator of how the image will print to a high-end output device.

MOST inkjet printers are sold for household use, and are meant to create an acceptable inkjet print (on the right papers), THIS IS NOT professional standard.

HERE ARE SOME GENERAL NUMBERS AND CONVERSIONS:

<i>Megapixels</i>	<i>Pixels in Image</i>	<i>Image Size on Monitor (72 DPI) in inches</i>	<i>Size at Print Resolution (300 DPI) in inches</i>
0.3	640 × 480	8.9 × 6.7	2.1 × 1.6
1.2	1280 × 960	17.8 × 13.3	4.3 × 3.2
2.0	1600 × 1200	22.2 × 16.7	5.3 × 4.0
4.0	2272 × 1704	31.6 × 23.7	7.6 × 5.7
3.0	2048 × 1536	28.4 × 21.3	6.8 × 5.1
5.3	3008 × 1960	41.8 × 27.2	10.0 × 6.5
6.3	3088 × 2056	42.9 × 28.6	10.3 × 6.9
11.1	4064 × 2704	56.4 × 37.6	13.5 × 9.0

RESOLUTION IS NOT ELASTIC. You cannot arbitrarily change an image's resolution without affecting image quality:

When you LOWER resolution (which any image editing program allows) you DELETE image data permanently.

When you INCREASE resolution, you artificially add information to the actual image data, leading to softer, fuzzier focus.

INTERPOLATION is the only way to adjust image resolution without ADDING or deleting from the actual data. (next handout will explain step by step how to interpolate images).

Higher end cameras have a variety of settings to allow you to determine how large (or small) a file you create. BE SURE to check what your camera setting IS—Most cameras are set to the lowest setting at the factory.

More megapixels can sometimes mean it takes LONGER for the camera to record an image, meaning you cannot successively click. This may mean you have to HOLD STILL longer when shooting images. EXPERIMENT with your camera and its settings, before taking an important trip. Allow time to look at test images ON SCREEN, not just on the 1" LCD on your camera. It's hard to see details on the camera's LCD. HAVE enough media that you can shoot extra images at different settings, if need be. Keep notes as you are testing or until you become familiar enough with your camera's settings.

MORE megapixels DOES MEAN better quality images but these are LARGER files and you cannot fit as many on digital media. The following chart gives some estimates of the relationship between megapixels, file sizes and media sizes.

APPROXIMATE NUMBER OF IMAGES PER CAPACITY

Camera Type:	File Size**	32MB **	64MB	128MB	256MB	512MB	1GB*	2GB	4GB
2 Megapixel	900KB	35	71	142	284	568	1137	2275	4551
3 Megapixel :	1.2MB	26	53	106	213	426	853	1706	3413
4 Megapixel :	2MB	16	32	64	128	256	512	1024	2048
5 Megapixel	2.5MB	12	25	51	102	204	409	819	1638
6 Megapixel	3.2MB	10	20	40	80	160	320	640	1280

REALIZE that NOT all cameras can work with ALL media sizes. CHECK before you buy!

LIGHTING has a number of impacts on your image. KNOW what 'color' light your camera's flash casts. (eg. The Nikon flash casts a rosey shade, the Sony flash is more yellow).

TIP your camera slightly to avoid the red eye effect. If you try to be slightly ABOVE your subject's eyes, and tip the camera slightly down, you can avoid the red eye effect. THIS also helps not get light bouncing off glasses or glass from windows, display cases.

TRY shooting with and without your flash, as well as shooting at different flash settings if your camera has them. YOU may need to hold still, or use a tripod when shooting without a flash.

HUMAN tripod tips: Steady yourself on something for long shots. Try to keep your elbows close to your body (that way you move less).

Web Refences for further information:

<http://www.pcworld.com/howto/bgguide/0,guid,12,page,3,00.asp>

<http://www.steves-digicams.com/>

<http://www.dpreview.com/>

CVA Media Reading Capacity

Media card readers are found in all the labs in the Summit Building: Rooms 301, 302 and 304. In addition, media readers can be found on some computers in the library. *Not all media readers can read all types of card.* Room 301 (the G5 lab) has the newest, most fully featured media card readers at every workstation. These can read:

Memory Stick,	Compact Flash
Memory Stick Duo,	Compact Flash II
Memory Stick PRO	SD
Memory Stick PRO Duo	MiniSD
Multimedia Card	RS-MMC
SmartMedia	xD