History of Photography

- The two main countries involved in the discovery of photography were France and England.
- In 1727 Johann Heinrich Schulze made the discovery that silver nitrate darkens upon exposure to light.
- The name photography, from the Greek meaning to write with light, was given to the new process by Sir John Herschel from England.
- The Calotype process was developed in England by William Henry Fox Talbot.
- The Daguerreotype was developed in France by a Louis Jaques Mann Daguerre.
- A very early form of camera was used in the 11th century to view the solar eclipse. The camera was called the Camera Obscurra which means dark room in Latin.
- Heliography was invented by Niepce from France.
- Film was invented long after the invention of the camera.
- Most early photographs were of objects and not people because of the length of time it took to make an early photograph.
- The year that is considered to be the birthday of photography is 1839 since that was the year the Talbot patented the process.
- The first war to be photographed was the Crimean War.
- The man credited with the first known photograph was Niepce from France.
- The direct positive image made on a silver plate was invented by the man from France named Daguerre.
- The first known photograph was taken in the year 1827.
- Film was invented by George Eastman the founder of the Kodak Corporation.
- Latent image is what you call an image that you cannot see until it is processed by some chemicals.
- The name Kodak came from the sound of an early camera and was given to his new company by George Eastman.
- The American Civil War Photographer Mathew Brady is known for the image of President Lincoln on the $5 bill.
- Color photography was invented in France by the Lumiere Brothers.
- The zone theory of Black and White Photography was created by the American Photographer Ansel Adams.
- The first female photographer to take pictures of the Great Depression and World War II was Margaret Bourke-White.
- In order to be a photographer in the early days of photography you had to know a great deal about chemistry.
- The early chemical process used to produce images was very toxic.
- The first CCD capture chip was invented at Bell Labs by two men Boyle and Smith.
- No one person or country can be credited with the invention of photography, but the process was the result of many different people in many different countries.

Chapter 1-Possibilities- An Introduction

- Digital technology has made great changes to photography over the past 25 years.
- Photography can be an important and fun part of your life.
• With film images you had to wait until the film was processed and then printed to see the images you had taken.
• With film images there was a cost for the film; processing and printing of the images, so the more images you took the more the cost. With digital images you can take as many images as you can store on your digital media.
• With digital imaging bad images can disappear since you can see what you take immediately on the LCD and erase the images you do not like or that are not properly exposed or in focus.
• Today the digital camera is much more automated than the early film cameras.
• The textbook we use in class was not designed to be a technology book but a book to teach the beginner about the principles of digital photography.
• You will take better images if you are familiar with your camera equipment.
• Unlike the film camera that was limited to 12, 24 or 36 exposure rolls of film, you can take many more images with your digital camera and are only limited by the size of the card you have.
• Kodak was founded by George Eastman.
• The following are advantages of digital photography over film photography:
  1. No film to process
  2. You can see your image immediately after you take it
  3. Duplicate images are exactly the same
  4. There is no cost to experimenting with extra shots
  5. Images can be sent over the Web and stored on your computer more easily
• Film can be damaged by airport x-ray machines.
• When you make a copy of a digital image the duplicate can have the same quality as the original.
• The craft of photography would include how you make the image like the correct exposure of the image.
• The shutter button is the part of the digital camera that you press to actually take the image.
• The LCD on your digital camera can be used to preview the image you will take or see the image after you take it.
• Advertising photography would be the area of promote in the types of photographs you take.
• Photography can be used to influence behavior like the images of children working in factors taken by Lewis Hine that led to Child Labor Laws.
• The LCD review of images has made all photographers, from beginners to advanced users, better photographers.
• To be a better photographer you should no longer look for subjects to photography but for photographs to create with your camera.
• Being comfortable with your camera is very important.
• Familiarize yourself with the camera’s main controls and functions.
• A good photograph is one that effectively uses the craft of photography and results in an image that affects the viewer in some way.
• You can easily adapt to varied conditions when using a digital camera.
• Extraordinary beauty can be found in the most ordinary places.
• With images and the sharing of images there is never a language barrier.
There are 13 areas that the author of the Kodak text lists as areas that cover the topics of photography:

1. Record-just to keep a record of things
2. Document-Used to document history
3. Family-Events and people in our families and lives
4. Beauty-Show the beauty of the world in God’s creation
5. Influence-Affect the way we act and behave with the images we display
6. Remember-Images of what happened in our lives to bring to memory our past
7. Creativity-To be artistic with your images
8. Sharing-To show off parts of our world with others
9. Business-Ads and other business applications
10. Communication-To communicate ideas and thoughts with others
11. Reveal-Show things you cannot see with the unaided eye
12. Promote-Get your viewpoint across like with advertising
13. Fun-Just for the fun of taking images

Some images are in several of these categories at the same time.

To see your subject and its relationship to the scene as a composition that creates a photograph is to see photographically.

The four important letters used by the author to promote photography for students were “I CAN”.

The two main advantages of having an LCD on your digital camera are: You can see the image you take immediately and you can help compose an image before you take it.

Chapter 2-Digital Components

Digital technology has changed rapidly over the past decade.

The light sensitive part of the digital camera is called the sensor.

All digital cameras have built-in computers that are used to take and process the image.

Digital noise is related to the ISO used in taking images. The higher the ISO the more noise or imperfections that that be introduced into an image.

Digital image quality of today meets and beats that of film.

The more megapixels in an image the higher the quality.

Today many digital cameras have megapixel quality of 18 MP or more.

Digital cameras with larger sensors take better images than digital camera with smaller sensors.

A digital camera with higher megapixels will need more storage space for the images it takes.

There are two types of sensors used in digital cameras today, the CCD and the CMOS. The CCS sensor was invented first.

RAW files are not compressed very much but JPEG files are highly compressed.

The most common file format type used in digital cameras today is the JPEG format.

RAW image files take up much more space in memory than do JPEG image files.

JPEG image files will load much faster than RAW image files.

Most D-SLR cameras today have live LCD screens which mean that you can see the image you are going to take before you take it and then after you take the shot.

An optical viewfinder is easier to see in daylight than a live LCD.

When you purchase a digital camera you want to be sure to get both an optical viewfinder and a live LCD.
• The part of the digital camera that focuses the light from the subject onto the sensor is the lens.
• Camera speed and lens speed is not the same thing. How fast a camera is ready to take an image and then take the image is camera speed. Lens speed describes the maximum size lens opening of the lens. The larger the lens opening the faster the lens.
• Pixels are the dots that make up the image and are usually measure in millions.
• The D-SLR camera allows you to view the subject through the lens and also usually allows you to change lenses.
• JPEG file format stands for Joint Photographic Experts Group and is fast, convenient, used by most types of digital cameras today and in a compressed format.
• There are many different types of file format with JPEG, TIFF, and BMP being some of the more common types.
• Digital noise is something entirely different, and can range from a non-issue that you never see, to a serious problem, to a creative possibility.
• Pixels are the individual light sensing photo sites on a sensor.
• The focal length of a lens changes how wide or narrow a view you can capture of a scene.
• Different image sensor sizes usually have different proportions.
• Many D-SLR cameras have sensor sizes based on the 35mm film size.
• Many advanced digital cameras now have internal processing to optimize your photos.
• JPEG files are based on a variable compression technology.
• RAW files are proprietary images files that hold minimally processed data from the sensor and have a large pool of data for working on an image.
• Use your LCD screen to experiment with your photography.
• There are two main types of sensors CCD which stands for Charge Coupled Device and the CMOS which stands for Complementary Metal Oxide Semiconductor.
• The key elements of the digital camera of today are:
  o The sensor-the light sensitive part of your camera that captures the image
  o The built-in computer use to process the image
  o The image format-used to store the image as a file on a storage device like the SD card, this format is usually in the JPEG format
  o The LCD screen to see what you will take and then what you have taken, also to provide information for the photographer in setting up the camera and image
  o Speed-How fast the camera can be ready to take images
  o Noise-Issues with digital imperfections in the image from low light and high ISO settings
• The sensor is made up of a pattern of pixels using three different filters made up of the colors red, green and blue-RGB.
• A moiré pattern is a pattern that comes from objects you photograph that have similar patterns to the sensor.
• To get rid of moiré patterns move closer or farther from the object you are taking an image of.
• An A/D converter stands for analog/digital converter and is used by your camera to convert the analog image signal into digital format.
• File formats are used by your digital camera to store the digital image on a storage card usually an SD (Secure Digital) card.
• LCD stands for Liquid Crystal Display and it is what the screen on your digital camera is called.
• A live LCD is one that shows you the image before you take it so that you can compose it better and then shows you the image you have taken.

Parts of a typical digital camera:

Chapter 3—Camera Work
• The average digital camera today has the power of a roomful of computers from 30 years ago.
• There are many different types of digital cameras on the market today, just make sure that the one you purchase works for you.
• A point-and-shoot digital camera is usually cheaper to buy and easier to operate than the typical D-SLR.
• Compact digital cameras make traveling easy.
• When looking to purchase a new digital camera be sure to look for one with high megapixels.
• When using a digital camera with high megapixels make sure you get a large storage card like a 16 GB card.
• Today memory cards cost less for more storage than they did even 5 years ago.
• A fast memory card will help you load images from the camera to the computer at a faster rate.
• To see the best view of the images you have taken be sure to view them on the computer and not just on the LCD of your camera.
• To prevent blurry images it is very important that you hold your digital camera with moth hands.
• Use the index finger on your right hand to press the shutter release button.
• The focus point can be changed on most digital chimaeras today.
In working with White Balance, the color white is considered to be a neural color.
With many digital cameras you can set a custom white balance using gray card.
Dust can be a problem with digital cameras that allow you to change the lens like a D-SLR.
Never use compressed air to clean the sensor area of your digital camera.
You can clean the sensor on a D-SLR but not on most point-and-shoot digital cameras.
To help avoid dust problems be sure to keep your camera and lens in a clean bag free from dusty areas.
Use a lens cap on the lens and be sure to put a cap on the D-SLR when your camera is stored without a lens.
The following digital cameras are list from the cheapest, starter camera to the top of the line digital cameras.
  o Pocket digital camera
  o Cell phone cameras
  o Advanced point-and-shoot cameras
  o D-SLR cameras
Some of the characteristics of the D-SLR are:
  o You can change lenses on them
  o They usually cost more than a point-and-shoot camera
  o Will have many advanced features
  o Are usually not an entry level camera
Removable data storage for digital camera are called:
  o Storage cards
  o Memory cards
  o Media storage cards
  o SD cards (most digital cameras use this type of card today)
The part of the digital camera that allows you to experiment with taking images is the LCD.
The part of the digital camera will tell you if you are having problems with your camera, lighting or just taking the image is the LCD.
When taking a digital image it is best to following these guidelines:
  o Keep your elbows close to your side
  o Squeeze the camera shutter button gently
  o Hold the camera in your right
  o Support the lens with your left hand
The Auto Focus feature of the digital camera will automatically focus the image for you.
Some good rules to follow when using the AF feature of your camera:
  o Know the difference between single shot and continuous shot
  o Know how to set the AF point
  o Look for contrast in focusing your image
  o Know when to set the camera on manual if you cannot get it to focus on the image
To use the focus lock on your camera, compose the picture and press the shutter button half way down, then you can reposition the subject in the image and press the shutter button all the way to take the image.
• Two factors that will cause the AF not to work well are:
  o Low light and a slow lens (not a very large lens opening like 3.8 or 4.5)
• Typical White Balance settings found on your digital camera are:
  o Auto
  o Bright Sun
  o Cloudy
  o Incandescent lighting
  o Fluorescent lighting
  o Flash
  o Custom setting
• D-SLR cameras have the most trouble with dust on the sensor because you can remove the lens to change lenses.
• You can test your camera to see if the sensor needs cleaning by:
  o Pointing the camera at a blank sky and taking an image and looking for soft-edged black dots on the image that will represent dust
• No matter what the camera, good photographs start with the appropriate technique for the subject and style of the photography.
• How you hold your camera makes a big difference in the sharpness of the image.
• Autofocus works mainly by looking for contrast in a scene.
• If you are having trouble getting your digital camera to focus in the AF mode you can always switch to the manual focus mode. The switch for this is found on the lens with Canon cameras.
• White Balance is the setting on a digital camera that affects the overall color of an image.
• To enter the world of digital photography all you need is a camera and light.
• In working with you LCD there are three things to remember:
  o Set the review time-usually the default is 2 seconds
  o Turn off auto-rotate-this will save batter life and let you see the image as you took it, vertical or horizontal.
  o Know the difference between live LCD for composition, review and playback-live LCD is when you use the LCD to view the image before you take it instead of the viewfinder, review is when you see the image right after taking it for usually about 2 seconds and playback is when you are scrolling through the images you have taken on your camera

Chapter 4-Exposure

• Today exposure is not usually a real challenge with the digital cameras since they can set the exposure for you using the built-in light meter.
• In the early days of photography you need so much light to take an image that you wanted to take the image with the sun behind the photographer shining as much light as you could get onto the subject.
• An exposure meter on a typical digital camera tries to make the scene appear as a middle gray tone.
• Bright whites can often fool the light meter in a digital camera.
• A bright sky cans also often fool the camera meter.
• TTL stands for through-the-lens and it is how the meter in a D-SLR camera measures the correct exposure.
• ISO is how the digital camera controls the sensors sensitivity to light with low ISO numbers being less sensitive to light and higher ISO numbers being more sensitive to light.
  o ISO 100-200 Low sensitivity to light, less noise, very sharp images, used in bright light
  o ISO 400-800 Higher sensitivity to light, more noise used indoor with lower light
    ISO 1600-6400 Very high sensitivity to light, can have great noise, used in very low existing light situations
• Higher ISO settings will produce faster shutter speeds and smaller f-stops to be used in your photographs.
• Exposure is the amount of light that is needed to make a photograph and it is controlled by the f-stop (lens opening-amount of light striking the sensor), shutter speed (how long the light strikes the sensor), and the ISO (the sensitivity of the sensor to the amount of light at the scene of the image).
• To stop action you need higher ISO settings and faster shutter speeds.
• To blur action you need lower ISO settings and slower shutter speeds.
• A shutter speed of 500 is slower than a shutter speed of 1000 since shutter speeds are actually fractions expressed as 1/500th of a second or 1/1000th of a second.
• Shutter speeds and f-stop (also called lens opening and aperture) are both fractions.
• Here are the typical shutter speeds:

<table>
<thead>
<tr>
<th>B=Bulb</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>15</th>
<th>30</th>
<th>60</th>
<th>125</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>1000</td>
<td>2000</td>
<td>4000</td>
<td>6000</td>
<td>8000</td>
<td>Not all cameras go to 1/8000th</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Digital cameras can have shutter speeds that are numbers between these standard settings since the camera computer sets the shutter speed-all numbers are fractions like ½, ⅓, ¼ etc. B stands for Bulb when the shutter stays open for as long as you keep the shutter button pressed.

Many digital cameras also have shutter speeds like 2 sec, 4 sec., 8 sec. all the way to 30 sec. before you get to the B setting. These fractions represent the time light is allowed to strike the sensor.

Here are the typical f-stops:

<table>
<thead>
<tr>
<th>1.4</th>
<th>1.8</th>
<th>2.0</th>
<th>2.8</th>
<th>4.0</th>
<th>5.6</th>
<th>8.0</th>
<th>11.0</th>
<th>16.0</th>
<th>22.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>These are also fractions but they represent the size of the lens opening that allows light to pass through to strike the sensor. The 1.4 and 1.8 f-stops represent very fast lens opening since the maximum diameter of the lens is large.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

• Exposure is a combination of f-stop and shutter speed based on the ISO setting to get the correct amount of light at the scene of the image.
• You want to be able to control the f-stops and shutter speeds to be able to control stopping action and the depth-of-field in an image.
• The best shutter speed for stopping fast action is 1/500th or faster.
• The best aperture for having the most in focus in an image is f16-f22 or smaller.
• The best aperture for blurring the background in a portrait is f2.0 or larger.
• When using very slow shutter speeds you need to have a good tripod.
• When you purchase a tripod be sure to get one with a quick release so that you can remove the camera very quickly.
• The formula for exposure is: \( E \) (exposure) = Intensity (f-stop) \( \times \) time (shutter speed) with the ISO setting helping to control the sensitivity of the sensor to the amount of light at the scene of your image.

• Depth-of-field is the amount of acceptable focus in your image. You control the DOF with the size of the lens opening, the focal length of the lens, and the distance you are from the subject. Very large lens openings 1.8 or 2 will give a very shallow DOF but very small lens openings like 11-22 will give great DOF or more in focus in the image.

• For most portrait images use an f-stop of 1.8 to 2.8 and for most landscape image use an f-stop of f16-f22.

• As you change the ISO, f-stop or shutter speed you need to make changes in the other components of exposure.

• The histogram is a graph of how the exposure of any image looks and you can see it on your digital camera or by using Adobe Photoshop.

• There is no one correct shape to the histogram of any image but you will usually see the brightness on the left and the darkness on the right. To make it brighter drag the slider on the right to the left and to make it darker drag the slider on the left to the right.

• The histogram can be edited in Adobe Photoshop and this is done by using levels.

• Most digital cameras have exposure compensation settings where you can increase or decrease the exposure of the image in 1/3 of 1/2 stop increments right on the camera.

• You can fix exposure problems using Adobe Photoshop but it is usually very hard to fix focus problems in an image.

• An image must have correct exposure and focus to be a good quality image.

• You can tell if the image you have taken is the correct exposure by looking at the image after you take it in the LCD and also looking at the histogram.

• The get better quality images use a lower ISO setting and medium range f-stops like f8.0 to f11.0.

• There are four reasons to be able to set equivalent exposures (changing f-stops and shutter speeds to get the same exposure)
  o To stop action
  o To blur action
  o To control the depth-of-field
  o To be creative in your taking images

• When using slow shutter speeds like below 1/30th of a second be sure to use a good tripod.

• Sports photography would require faster shutter speeds and shallower DOF.

• Portrait photography would require slower shutter speeds and shallower DOF.

• Landscape photography would require slower shutter speeds and great DOF.

• If you want to have your camera set the exposures for you use the P or A setting on a Canon camera.

• AV on the Canon is for aperture priority and TV is for shutter priority. With AV you set the aperture you want and the camera finds the correct shutter speed to give you an accurate exposure, with TV you set the shutter speed you want and the camera finds the correct aperture to give you an accurate exposure.

• TTL or Through-the-Lens metering that reads a scene to give exposure information to the camera is used in most digital cameras to get a good image.

• Shutter speed is the length of time a shutter is opening in order to let light in and strike the sensor.
- The lens opening is a variable opening inside the lens that affects the quantity or amount of light hitting the sensor.
- If the shutter speed changes than the aperture must also change.
- Most digital cameras allow the photographer to set the manual mode where you can set the f-stop and the shutter speed yourself.
- You can also set the camera to manual focus where you have the focus on the subject yourself.
- A histogram is a visual indicator of exposure as seen in brightness values of pixels.
- Underexposure will show up with little or no data on the right side of the histogram while the rest of the data is skewed to the left. Overexposure is just the opposite.
- The LCD on your camera will come in handy when experimenting with exposure compensation.
- The three components of good exposure are:
  - Gives you the right image tonalities of brightness with the subject in the best light
  - Strikes a balance between highlights and shadows with good details in both the highlights and shadows.
  - Keeps the digital noise to a minimum. Underexposure will always produce more digital noise in an image.
- Exposure bracketing is where you take 3 images in order, with one that is underexposed one that is at the correct exposure and one that is overexposed. The Canon cameras can be set to do this automatically for you.
- The three controls of exposure are:

<table>
<thead>
<tr>
<th>Exposure control</th>
<th>Aperture</th>
<th>Shutter Speed</th>
<th>ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>What it does for the camera</td>
<td>Controls the size of the lens opening for the amount of light (intensity) that strikes the sensor</td>
<td>Controls the speed of the shutter or how long it stays open, the time of the exposure</td>
<td>Controls the sensitivity of the sensor to light, lower numbers less sensitive, higher numbers more sensitive</td>
</tr>
</tbody>
</table>

- The three names for the size of the lens opening are:
  - Lens opening
  - Aperture
  - F-stop
- The aperture of the lens if like the pupil of the eye and the shutter of the lens is like the eyelid of the eye.
- The eyeball of the eye is like the camera body of the camera and the retina of the eye is like the sensor of the camera.
- DOF is controlled by the aperture, focal length of the lens and the distance you are from the subject.
- There are three AE (auto exposure) modes on most digital cameras:
  - Program
  - Shutter Priority (TV)
  - Aperture Priority (AV)
  - Many cameras also have a setting where the camera sets everything for you
Chapter 5-Daylight Photography

- Daylight photography is one of the most common types of photography where you use the sun outside for your images. There is also flash photography and existing or available light photography.
- Light has a huge effect on how a subject looks in an image.
- Daylight changes with the time of day.
- Bright sun on a very clear day will produce sharp shadows and highlights in any image.
- With bright sunlight you can use faster shutter speeds and smaller apertures to get better images.
- When taking daylight images be sure to expose for the highlights.
- When taking portraits in bright sunlight you might have to move to open shade to get better images.
- Open shade will have less harsh shadows.
- Light direction plays a very important part of how the subject will look in an image.
- When shooting with backlighting it is important to expose for the shadows.
- Reflectors work best when the subject is closer to the subject and camera.
- Light is the most directional in the early and late parts of the day.
- The color of daylight changes with the time of day.
- Daylight photography is so popular because:
  - It is easy to use
  - Daylight is the primary and most popular light available
  - Daylight illuminates subjects and their environment in ways that meet our expectation for light
- Daylight has the following qualities:
  - Can be harsh or gentle depending on the time of day
  - Can be warm or cold again depending on the direction and time of day
  - Can be flat or directional depending on the time of day and the position of the sun in the sky
- Some subjects that are great for daylight photography are:
  - Landscapes
  - Beaches and snow scenes
  - Travel photography
  - City skylines
- Some subjects that are not so great for daylight photography are:
  - People portraits
  - Details in small objects
- Another name for diffused sunlight is soft light.
- With heavy over cast daylight images you have very little direct sunlight.
- Light tens to bed the clearest and crispest first thing in the morning.
- The key to working in bright sunlight is to watch those highlights and shadows and be aware of where they are in your frame.
- Open shade is much softer than bright sunlight and has gentle highlights and shadows.
- With cloudy bright light the entire sky becomes the light for your images.
- Rain can add an interesting element to a cloudy day scene.
- Strong directional lighting helps create form and texture in a photograph.
- Texture appears when light hits the raised parts of a surface and shadows appear in the low parts.
• Color and tonal patterns in a subject need to be illuminated by light in order to be seen in the image.
• Using a reflector is a simple way to add light into dark shadows. You can also use fill flash to help fill in shadows when taking images in the bright sun.
• White balance has a great effect on what light looks like in your photo and can be changed on the D-SLR camera.
• Daylight is light that originates from the sun and that appears outside during the day.
• Direct sunlight has harsh shadows whereas open shade found outside does not.
• The five types of daylight are:
  o Bright sun on a clear day
  o Open shade outside
  o Hazy sun
  o Cloudy bright light
  o Heavy overcast
• The eight effects of light direction that appear with daylight photography are:
  o Direction
  o Shadows
  o Form
  o Texture
  o Color
  o Pattern
  o Separation
  o Depth
• There are seven ways to control the contrast of light when taking daylight images outside:
  o Use fill flash
  o Use a reflector
  o Wait for a cloud
  o Block the light using a reflector or other blocking device
  o Diffuse the light
  o Move to open shade
  o Use backlighting
  o Wait for another time to take the image
• Three important elements of daylight that are affected by the time of day are:
  o Color of the light
  o Direction and dimension of the light
  o Crispness of the light