Challenge/Culture & Society	Photography	0	Purpose: To recognize photography knowledge and skills.
Challenge/Culture & Society	Photography	1	Demonstrate and explain the use of your camera (video, or other).
Challenge/Culture & Society	Photography	2	Explain how your camera records an image, and the developing process if appropriate.
Challenge/Culture & Society	Photography	3	Present various examples of your work, describing the composition, choice of subject matter, and lighting and exposure.

The Basic Principles of Photography:

Light:

Varies in intensity	Varies in colour
Sunrise	violet
Sunset	red
Sunshine	white - stark
Overcast	diffused
Midday	short shadows
Midnight	
Indoors	green or orange

How to control light:

The amount of light getting into the camera is critical.

There are two ways of controlling it ... accurately.

- Shutter Speed, and
- Aperture

Shutter Speed is the length of time a shutter remains open.

It could be 1/8,000 of a second or 8 hours.

Aperture is the size of the hole through which the light passes.

f1, f1.4, f2, f2.8, ...f32

The two combined control the exposure.

Exposure - exactly the right amount of light must hit the film to expose it correctly.

At any given moment, the amount of available light is a measurable commodity.

Camera Settings:

As discussed before, the amount of light hitting the film is critical, and the amount of light entering the camera can be controlled by making camera setting adjustments ... Shutter Speed and Aperture

Shutter Speed:

Shutter speed can range from 1/8000th sec to 8 hours or more. The amount of light getting on to the film is exactly halved or doubled by halving or doubling the time the shutter is open... makes sense?

So, 1/2 sec will let in double the light that 1/4 sec will.

Likewise 1/250th sec will let in half the light that 1/125th will.

Aperture:

Aperture can range from f1 to f32.

The amount of light getting to the film is exactly halved or doubled by halving or doubling the size of the aperture hole (which is measured in f numbers).

f numbers are the same for all lenses. Therefore f8 on a 24mm lens will let in the same light as f8 on a 200mm lens.

f8 will let in double the light that f11 will.

Likewise f22 will let in half the light that f16 will.

The Exposure:

Shutter speed and aperture are related such that if you halve the shutter speed and double the aperture you are still allowing the same amount of light into the camera

for example, an exposure at 1/125th sec and f16 is exactly the same as 1/250th sec and f11 or exactly the same as 1/60th sec and f22

The Relationship:										
Shutter speed	1/8	1/15	1/30	1/60	1/125	1/250	1/500	1/1000	1/2000	1/4000
Aperture	f22	f16	f11	f8	f5.6	f3.5	f2.8	f2	f1.4	f1

All the above shutter speed/aperture combinations give exactly the same amount of exposure.

How to measure the light -

Light Meters:

Available light is measured by a light meter. Light meters can be hand held or built-in to the camera.

A simple built-in light meter gives a simple indication of the correctness or otherwise of the exposure.

A more advance built-in light meter will tell you what camera settings to make or even make the settings for you.

Very advanced cameras such as the F5 have several modes of metering the light

- Spot metering
- Centre weighted metering, and
- Matrix metering

Hand held light meters can be very accurate (and very expensive).

Setting the Camera:

How do you chose the right shutter speed/aperture setting to take a correctly exposed photograph in a given light source?

The best answer is - chose one and let the camera choose the other!

For example choose to shoot at 1/60th sec and allow the light meter inside the camera to nominate the correct aperture.

Or choose f8, for example, and allow the light meter to work out which shutter speed is correct.

Hint: Don't look at the list above. Those combinations are only valid for one theoretical light source.

What affects your choice?

Choosing a Shutter Speed:

What shutter speed should I use? What are the factors affecting my choice?

Answer(s):

- Aperture setting
- Subject movement
- Camera movement
- Lens size
- Available light
- Tripod
- Artistic effect
- Film speed

Notice, in this picture, (click on the image to enlarge) how the shutter speed - 1/100th of a second - failed to freeze movement in the man and his spear, but was quick enough to perfectly freeze the shield which wasn't moving as much. This is not a flaw, however, adding to the sense of action.

All these considerations may affect your choice of shutter speed in some way.

What are the factors affecting shutter-speed choice?

- Aperture setting

- Subject movement
- Camera movement
- Lens size
- Available light
- Tripod
- Artistic effect
- Film speed

All these considerations may affect your choice of shutter speed in some way.

Aperture setting:

We have alread discussed the relationship between shutter speed and aperture and how one affects the other.

But consider if you want a fast shutter speed like, for example a dull day with diffused light. You may want (for various reasons) to choose 1/2000th of a second, but in the low-light conditions, even the widest aperture won't allow enough light to hit the camera. So, aperture in these circumstances won't allow the shutter speed you want.

Notice how, in this case, a wide aperture - f2.8 - kept the subject sharp while throwing the background out of focus

click on the image to enlarge

Subject movement:

If the subject is moving you will want to freeze the action. In other words you don't want a picture where the subject or parts of it are blurred (or do you? That's where artistic effect can come in).

To freeze the action you must use a fast shutter speed.

But remember the relationship between shutter speed and aperture? ... if you increase your shutter speed (letting in less light) you must compensate by opening the aperture by a commensurate amount (to let in more light).

A rough guide:

- A running football player 1/250th (unless he's running away!)
- A speeding car 1/500th
- Mick Doohan 1/1000th
- An F18 Hornet 1/2000th
- A Scot opening his wallet 1/4000th
- A bullet 1/8000th

Camera movement:

The camera may be moving for a number of reasons;

- body shake
- vibrations
- following subject (panning)
- vehicle movement (with camera inside)

Again, shutter speed needs to be increased to freeze the action - or, you could do something to eliminate the movement.

Here's a tricky situation where compromise was needed. Travelling in the back of the lead aircraft, I decided I would have to use a high shutter speed (1/500th) to combat vibration. This, however, almost "stopped" the propellers on the subject aircraft (below). A more natural effect is achieved by using a slower shutter speed (1/125th) above. The vibrations of the aircraft I was travelling in were overcome by relaxing my arms to dampen the movement. I also took about 100 shots to get about 20 good ones.

Lens size:

Shutter speed needs to be increased in proportion to the focal length of the lens.

Unless you use a tripod, some body movement is unavoidable.

Long lenses amplify any movement.

A rough rule of thumb is to set the shutter speed at least the same if not greater than the focal length of the lens.

for example;

- 100mm lens 1/125th
- 150mm lens 1/250th
- 200mm lens 1/250th
- 300mm lens 1/500th
- 600mm lens 1/1000th

click on the images to enlarge

Available light:

Available light may be so low that even at the widest aperture the shutter speed needs to be very slow, for example, nighttime when you may get to use the infamous 8 hour exposure.

Or the opposite situation where the light is so intense that the narrowest aperture may still require a fast shutter speed, for example, midday with high-speed film.

Tripods:

The tripod is a very handy tool whose main purpose in life is to allow the photographer to reduce shutter speeds.

It eliminates camera movement - allowing the infamous 8 hr exposure.

It can also be used with the 600mm lens to allow useable shutter speeds.

Artistic effect:

What if I want to have some blurred movement in my photo? Go right ahead - experiment.

- Waterfalls with white wispy water.
- Sharp subject with blurred background (panning)
- Sharp background with blurred subject.
- Just blurred everything.

If you know the theory and can predict what the result might be you won't waste film (much).

Or if you get the effect unexpectedly, you'll know why.

Film Speed:

I'll talk about this in more detail in a separate section.

Perhaps you are beginning to notice that everything is affected by everything else. This is certainly true.

The whole thing is one giant balancing act, weighing up many different factors, with that one ultimate goal - get exactly the right amount of light to hit that little square of film - the correct exposure.

Choosing an Aperture:

What Aperture should I use?

What are the factors affecting my choice?

Answer:

- Shutter speed
- Depth of Field
- Artistic effect

All of these considerations may affect your choice of aperture in some way. Let's discuss them.

Shutter Speed:

The relationship between the two has been examined in depth.

If you are still unsure it might pay to go back for a little revision.

Depth of Field:

Depth of field is a big subject and a little tricky to get a handle on.

At this stage we only need to know how to get the results rather than why it happens.

But here are the basics:

If a person standing two meters away is in focus but a bus ten meters behind is barely recognizable because it is out of focus, then this photo is said to have a shallow depth of focus.

If the same person is in focus and the bus is in focus and the mountain range in the distance behind the bus is also in focus, then this photo has greater depth of focus or depth of field.

The whole concept is discussed in terms of **depth of field**.

The rule to remember is - the wider the aperture, the shallower the depth of field.

Depth of field is also affected by lens length. For example, a photo taken with a 14mm lens has almost infinite focus (at f22), from the pebble six inches away to the mountain 20 kms away.

On the other hand, a 200mm lens at f2.8 could have a person's eye in focus while his ear is not.

Which brings us back to Artistic Effect.

Artistic Effect:

When deciding to choose aperture and letting the camera or light meter dictate the shutter speed, we do so mainly for artistic reasons.

But don't forget the relationship between the two. You may not be able to do what you want.

Depth of field is what we're after.

A narrow aperture - f8 on an 18mm lens - gives depth of field - that is, the foreground and distant background are equally sharp.

click on the image to enlarge

Greater Depth of Field:

For example, landscape photography is best done with greater depth of field.

Some foreground detail is a good idea to add interest to the otherwise boring background.

This foreground detail needs to be in focus.

To achieve this effect a narrow aperture is required, for example, f22.

Shallow depth of Field:

Portraiture is best done with a shallow depth of field to separate the important subject from a cluttered or uninteresting background.

To put the background out of focus - a shallow depth of field - a wide aperture is required, for example, f2.4

In this case, a wide aperture - f2.8 on a 200mm lens - kept the subject sharp while throwing the background, which was a white car anout 4 meters away, out of focus.

click on the image to enlarge

Of course there are exceptions to every rule. That's what artistic effect is all about.

And besides, none of these are rules, they are all just guidelines to help us understand the principle.

Taking a photograph:

Now that we've got some grip on the technical stuff, what about the artistic side? Here are a few basics to consider before you press that button.

Composition:

Probably the area where most budding photographers come to grief.

We could wax lyrical for hours about photo composition and lay a million rules on you for what you can or can't do.

But there are a few basics to remember.

The Rule of Thirds:

Arranging the subject to one side of the picture makes for a much stronger image than keeping it central.

click on the image to enlarge

Most photos look artistically superior if they are not symetrical.

Place the emphasis of the photo to one side or towards either the top or bottom of the photo.

With landscapes, either the land or the sky is usually the interesting feature, so the feature should dominate the photo. Don't devide the photo equally between the two.

With people, the biggest mistake is to focus on the face and leave the face in the centre of the frame.

If the face of a person is in the middle of a picture and the feet at the bottom, then the half of the picture above the face is filled with nothing.

Try to compose the picture with the face to one side and in the top 1/3.

Or if you are photographing a group of people, it stands to reason that the middle of the people (i.e. the bellies) should be in the middle of the picture.

Distractions:

Watch out for the pole behind the subject. In a flat photo it could appear to be growing from your best friend's head.

If the subject is on the right hand side of the photo and is looking to his left (our right) he is looking out of the photo. This is distracting because the viewer will wonder what he's looking at.

Similarly roads, railway tracks, telegraph lines, footpaths, in fact lines of any kind should lead into the photo.

The photo is too busy - backgrounds irrelevant to the subject can distract from the story you are trying to tell.

Low Light Photography:

How can you take a photo in low light?

There are a number of things you can do.

- Decrease shutter speed
- Widen aperture
- Use a tripod
- Use faster film
- Use a flash

Any one of these can increase your chances of getting a correct exposure in the trickiest situations.

Or by combining any or all you can achieve good results in lousy light conditions.

We have already covered the first three, so let's look at the other two.

Film Speeds:

Film is available in a wide variety of ISO speeds, for example, 25, 100, 400, 800, 1200, 3200.

So how does it affect the other variables (shutter speed and aperture)?

100 ISO film needs twice as much light as 200 ISO - 200 ISO film needs twice as much light as 400 ISO - 3200 ISO needs half as much light as 1600 ISO, etc.

Or in other words, 100 ISO is one stop slower than 200 ISO - 3200 ISO is one stop faster than 1600 ISO and so on.

Therefore if we had been shooting at 1/60 sec at f 2.4 on 100 ISO film and changed to 200 ISO we would now need less light to record an image. So we could increase our shutter speed to 1/125 sec OR our aperture to f3.5, but not both.

Without flash, even low light shooting can still net useable results. In this case the conference room was lit by flourescent lights, the camera set at 800ISO, 1/25th of a second shutter speed, with a 200mm lens at apeture f2.8 and sitting on a monopod.

click on the image to enlarge

Flash Photography: is probably the greatest waster of film for the uneducated.

When light levels get too low for normal shutter speed/aperture combinations, it makes sense to simply introduce more light - artificially.

When can you use flash?

Anytime, day or night, inside or outside, darkness or sunshine.

When should you not use flash?

When the subject is too far away.

Generally speaking if the subject is more than five meters away (unless you have a powerful flash) you are wasting your time - or more importantly, your film.

How many times have you seen someone taking photos of fireworks with a flash? Is anyone brave enough to admit they too have been so silly?

The worst example is a sports venue.

When you look at an Olympic event on TV, you can see thousands of flashes going off in the giant stadium.

None of those photos will be properly exposed.

The worst thing is, most of those people don't know what went wrong when the film comes back from the shop with lots of black pictures (if the shop bothered printing them). Or perhaps there was such a long period between taking the photo and getting the film developed that they've even forgotten what was supposed to be on the film.

The only way to get a photo in the Olympic Stadium-type situation is to use your knowledge of photography. Use a slower shutter speed, wider aperture and faster film and a tripod too - but no flash.

It may also be wise not to use flash when it might upset or distract the subject, as in the conference setting above.

Built-in flash:

A built-in flash in a camera is very handy. However the range is very limited.

Built-in flash, when used within it's limitations will give good results because it is an integral part of the camera and therefore puts out as much light as the camera tells it to for the circumstances.

Off-camera flash:

Off-camera flashes come in many shapes and sizes, from small hot-shoe flashes to large, powerful free-standing units.

Flashes are normally connected to the camera by the shoe or a cable or can be 'slaved'.

Slaving means they are not physically connected to the camera. They go off by remote control, usually when they detect another flash, perhaps from the camera.

Using flash in low light:

Photography in low light is trickier than simply introducing a flash.

Yes, a flash will give you the light required to make the exposure. But it is a harsh light which introduces it's own set of problems;

- Red-eye
- Shadows
- Flat
- Limited range

Red-eye:

Red-eye is caused by the flash bouncing off the inside of the eyeball when the iris is wide open, and coming straight back to the camera.

To overcome this problem you could try one of three things.

1. Some cameras have "red eye reduction" where several less intense flashes are directed at the subject to force the iris to close down before the flash proper.
2. Using an off-camera flash reduces the problem because light reflects off an object at the opposite angle it hit. So in theory if the flash is on one side of the camera and the light enters the eye and reflects, it will reflect to the other side of the camera, not into the lens.
3. The third option is to bounce the flash off a suitable nearby wall or ceiling.

Shadows:

Shadows can be very distracting and actually spoil an otherwise good photo.

Bouncing the flash off a nearby wall or ceiling will eliminate the problem, although new shadows may appear under eyebrows, noses, chins etc.

In this case, a second, lesser flash can fill or soften these new shadows.

You could also move the subject away from the background onto which the shadow is falling.

Flat light:

Flash is a harsh, flat light.

To overcome this problem - soften or bounce.

You can soften the harsh light by diffusing it through a cover on the flash.

Buy a special diffuser filter or make one. A simple white handkerchief or even tissue paper will do in a pinch.

As mentioned previously, beware of new shadows caused by bouncing.

The other thing to be cautious of is colour casting. The bounced light will be the same colour as the wall or ceiling when it hits the subject. So only bounce off white or near-white objects.

As I said, you can bounce off walls or ceilings but you can also use a reflector you introduce, such as a sheet of polyurethane or even a sheet of paper.

Range:

Flashes have very limited range.

The range is dictated mainly by the power of the unit.

There's very little you can do about range except buy a bigger flash.

A powerful flash could cost you more than your camera did. So assess whether you really need it.

Using flash in daylight:

In this image, the mid afternoon sun is shining from the left of picture. By using flash the lead man's face is properly lit on both sides.

click on the image to enlarge

Flash can be used in daylight for various reasons.

Fill flash is used to "fill" shadows, especially in sunshine. For example, to light up a face shaded by a hat.

The exposure, in this case, is set the same as if no flash was going to be used.

The extra light from the flash is only lighting the dark areas, so it won't over expose the film.

It could also be used to make the subject stand out from a very dull background on a dull day. It can also be used to freeze action.

The actual flash is an extremely short burst of light, therefore anything illuminated by the flash is frozen as if a high shutter speed was used. This can be used to produce very artistic images.

It can be used to brighten up a face when the sun is behind the subject.

The myth that you have to have the sun behind the camera, is just that ... a myth. But care must be taken. (As usual, experimentation is necessary to understand what can be achieved.)

Trap for young players:

Flash Sync Speed. (Flash Synchronisation Speed)

Every camera has a flash sync speed and it varies from camera to camera.

If you take a photo using flash with a shutter speed higher than the flash sync speed, the shutter will have opened and closed before the flash fires, giving you an underexposed photo.

Or the shutter could be half way through it's cycle when the flash goes off, with the result that half (or other portion) of the picture is dark and half properly lit by the flash.

You can, however, choose any shutter speed slower than the flash sync speed.

Flash sync speed is normally marked in red on the shutter speed dial on top of your camera or, with automatic cameras, you may need to consult your manual.

Some cameras will simply not allow you to shoot faster than the sync speed.

Flash is by far the hardest aspect of photography to master.

How to Take a Photograph:

Consciously and or subconsciously (tending more towards the latter as you practice) there are many things to think about when taking or preparing to take a photograph.

Sometimes a photo opportunity presents itself and you don't have time to think. You snap and hope for the best.

But normally, and if you want to get a photo to be proud of, you must think it through.

Here are the basic considerations, roughly in order, leading up to and after taking a photograph.

Equipment:

Preparation of your equipment is important.

It should be well looked after, maintained and clean.

But equipment selection is also important.

It's not always necessary to take absolutely everything you own. Nor is it necessary to rush out and buy stacks of expensive gear.

But if you have the capacity to take all your gear comfortably - well, you never know what opportunity might spring up.

The important thing is to make sure, as far as possible, that everything is working as it should.

Change or charge your batteries regularly and always have spares.

If a problem arrises on one shoot, get it sorted as soon as possible after. Don't let the same problem catch you out next time.

Don't rush out and buy a whole lot of gadgets and gimmicks you may only use once.

Here's a list of equipment you must have;

- a camera
- a lens (most camera package deals offer 35-80mm zoom or similar as standard. If this is an option take it, even if you have to chip in a few dollars more)

  It's a short list, eh?

Here's a list of equipment you should have;

- a sky light filter (primarily to protect the lens)
- a cleaning kit

Here's a list of equipment it would be nice to have;

- an equipment carry bag
- a tripod
- a cable release
- a second lens (if you have the 35-80mm zoom, then a good companion would be a 80-200mm)
- a flash

Here's a list of equipment you can start adding when you really get serious;

- more lenses
- a range of filters
- a light meter
- a field vest
- an assistant

The one thing you must have which you can't buy - is patients.

Setting Up:

Choose the type of film you will use;

- Slow (100 ASA or less for portraits) (small grain size)
- Medium (400 ASA for normal action)
- Fast (1600 or 3200 for low light or extreme speeds) (very grainy)
- Negative (for prints)
- Positive (for slides)
- Black and white
- Infrared
- or no film at all if you go digital (as I did recently)

Set the ISO (ASA) on the camera - vitally important.

Some cameras can read the ISO off the film case

Choose a lens (if you have more than one)

Tackling the Subject:

When you have decided what to photograph, remember the composition lessons you have just learnt;

- watch for distractions - "busy" background, "growths"
- rule of thirds
- lines drawing the eye out of the photo
- subject looking out of the photo
- cropping
- include supporting detail or contrasting detail
- photograph to a market - think, 'what will this be used for?'

Push the Button:

But before you do;

- choose whether shutter speed or aperture is the priority - choose your aperture or choose your shutter speed and let the camera decide the other
- focus (yourself as well as the camera)

Handling the Film:

The exposed film is very valuable to you. You have invested a lot of time, effort and possibly money into capturing those images. You may have travelled to get them. It may cost you a lot of money if you have to reshoot.

Your film is very valuable to you, but only to you.

Anyone to whom you entrust your film will only compensate you for loss or damage to the value of the material cost involved - that is, $15 (or whatever it's worth) for a new roll of film.

So, only entrust your valued film to someone you trust. That may be K-Mart, your local chemist or any one-hour shop - or you could seek out a prolab (professional laboratory).

When travelling, be aware that airport security X Ray machines can damage your film. They are generally advertised as being "Film Safe". This is true to a certain extent, but the effect is cumulative. In other words, it's not advisable to allow the same rolls of film to go through an X Ray scanner more than five or six times. But don't fret too much, once or twice through the scanners is no problem.

High-speed film is more sensitive than normal film.

You could secure your film in lead containers or a lead-lined pocket, but in today's security environment I wouldn't like to try that one. You could also ask that your film containers be hand searched - but for the same reason, I wouldn't risk annoying the security people.

Generally speaking, I have never worried about putting film through X Ray and I have never regretted that decision.

Digital crap or digital gold

People have often sent me photos hoping to have them published in Platypus, AFP News, Army Magazine, J.GENCA etc. But, too often these people are disappointed.

Why?

Well, it usually comes down to digital cameras.

Many people have digital cameras these days and, while many are for private use, they are sometimes used for that special, dramatic, unpredicted and/or often historic occurrence.

The problem is that image resolution, in more instances than not, is too low.

A photo may look great when downloaded to a computer but, when resolution is low, it is *only* suitable for viewing on a computer screen.

- Computer screens are optimized for 72 dots per inch (dpi).
- Glossy magazines require 240 dpi.
- Newspapers and newsletters require 160 dpi.
- An ordinary photograph is 300 dpi optimum.

This means a terrific-looking photo on your computer screen suddenly becomes the size of a postage stamp if published in a high-quality medium like a magazine.

So, if you are out and about and the world erupts around you (God forbid) and you manage to fire off a couple of photos, the value of the photo is greatly limited if the camera is set for low resolution.

The same applies to that excellent baby snap you took, or your best friend's wedding or kid's graduation etc etc.

Why do people set their cameras for low resolution?

Because they can fit more photos on to their storage disc/card.

But, surely it is better to have 20 usable pictures than having hundreds of great looking (only on computer) photos that cannot be printed or used for any other purpose.

PLEASE – set your digital camera to its highest resolution settings – now. Consult your owners manual.

A good guide when fiddling with your settings is - the fewer pictures the camera tells you you have left, the better.

On my 6.2 megapixel camera, for example, the shots remaining readout says 151 when I have a blank 512 megabyte card inserted.
If you have a 4 megapixel camera, for example, expect to fit about half as many pics on the card as there are free megabytes - that is, if you have a 16 meg card, expect to take 8 pics or there abouts - if you have a 124 meg card, expect to take about 60 pictures, and so on.

Remember – a big photo can be cut down to size but a small photo is next to useless.

Assignments Part 1:

Now that you (hopefully) have a better understanding of the basics of photography, try these assignments.

Submit your best image in each.

1. * Produce a photo of a moving subject with the camera moving and with the camera steady. (2)
2. * Produce a photo with shallow depth of field and one with maximum depth of field. (2)
3. Produce a series of photos using all natural light;
    - sunny day
    - cloudy day (2)
4. Produce a series of photos using artificial light;
    - flash (in daylight and at night)
    - fluorescent
    - candescent (globes) (4)
5. Produce a formal portrait of someone you know. (1)
6. Produce a candid portrait of someone you know. (1)

There are 12 assignments here. You must produce at least 9 of them. Those marked * are compulsory.

Assignments Part 2:

After completing Assignments 1, try these.

Submit your best image in each category.

1. Produce a candid portrait of a stranger. (1)
2. Produce a landscape photograph. (1)
3. Produce an action or sports photo. (1)
4. Produce a still life or nature photo. (1)
5. Produce a series of photos using all natural light;
    - moonlight
    - stars
    - indoors (3)
6. Produce a series of photos using artificial light;
    - candle light
    - car lights
    - street lights (3)

There are 11 assignments here. You must produce at least 8 of them.

When you are finished, bring your images to the activity night and we will post them on our scout site.

Copied from: http://bigirishgit.com/photography/courseintro.htm