Infrared Filter Options

720nm
This is the most common filter. It allows only IR light to pass from about the point where visible light ends, and allows the sensor to see IR frequencies up to around 1000/1200nm, depending on what the sensor will allow. You can shoot false colour IR images, or convert to B+W as you wish. The 720nm filter can produce stunning B+W images, but has slightly less contrast than the 830nm images. Contrast can be added in post production to achieve very similar B+W results. This makes the 720nm a good all round conversion. Once converted with this filter, your camera will shoot roughly the same shutter speeds as an ordinary visible light camera, except on very overcast days where the moisture held in the clouds will mean there may be less IR light coming through.

830nm
This is a B+W only filter. It allows the camera to see only the part of the IR spectrum from around 830nm to the end of the sensor's capability. The filter material itself is slightly 'darker' than the 720nm, and you would normally lose around 1-1.5 stops of light as compared to a visible light (or 720nm) camera in the same conditions. The 830nm has slightly more contrast in B+W images, but the 720nm can match it with a little tweak of the contrast in post production. Being that the 830nm filter allows the narrowest band of wavelengths, it could be said to be a tiny touch sharper than filters that pass a wider bandwidth.

665nm
This filter allows IR light to pass, just as the 720nm filter does, but also lets through red visible light. This gives you a little more colour to play with when channel swapping and produces images with stronger colour. The plants and foliage in colour images taken with the 665nm are not pure white as they are when taken with a 720nm filter, but they have more of a light blue tinge, which turns to a slight yellow tinge when you perform the red/blue channel swap. (Swapping the red and blue channel output can give you a blue sky on your IR image). For black and white images the 665nm will have less contrast, and may not be as good as a 720nm or 830nm conversion.

590nm
Allows IR light, and red visible light as per the 665nm, but also allows the camera to see orange, and even yellow visible light. This produces a slightly different colour scheme to the other filters. Plants and foliage taken with the 590nm filter are a strong blue colour, and once you perform a channel swap you will end up with very strong yellow foliage. This colour scheme is very striking, and interesting, and can be further manipulated to produce other hues, but it is not to everyone's taste. One other consideration is that this filter allows a wide bandwidth compared to the 720nm or 830nm, and due to the fact that each individual wavelength will focus at a very slightly different point, the wider the bandwidth you are looking at the softer the image will be. The 590nm images are not soft as such, but they are perhaps a touch less sharp than the 720nm or 830nm.

The results from these filters can be compared by typing in '720nm' or '590nm' etc. in to Google Images, and you should be able to get some idea of the different colour schemes that each of the filters will give you. If you see colour IR images with blue sky, then these will have been manipulated in post production by swapping the red and blue channel output. Please be aware that what you may find in Google images may not always be correctly labelled.

Quartz Glass / Full Spectrum
You can also have quartz glass conversions, which allow the camera to see the full spectrum that the sensor is capable of seeing (From IR, through visible wavelengths, to UV). You can then use various filters in front of the lens to filter or pass different portions of the spectrum, and narrow the bandwidth in any way you require. This conversion is commonly used for scientific, and industrial applications, and often needs manual focussing via live view to give the sharpest results.

With SLR cameras converted to full spectrum, the AF system of the camera can be set to be correct for visible light, but it will not be correct for IR light when using an IR filter for example as the IR wavelengths will focus at a different point. Also, the AF system of many SLR cameras will not work with dark filters. For these reasons you would need to use manual focus with the live view function to accurately focus your images. Some SLR cameras have Auto-focus in live view which works directly off the sensor, but these systems tend to be very slow. Please note some older digital SLR cameras do not have the live view function.
With many compact or micro 4/3rd cameras the AF system functions directly from the sensor itself, and so in theory they will always give correct focus. This makes them very suitable for full spectrum conversions if required.

Full spectrum cameras can be used with a wide range of front of the lens filters to cut or narrow the spectrum to various bands of wavelengths including any of the IR filters or a UV filter.

For comparison, a thermal imaging camera will typically record infrared as heat in the region of 10,000nm.

Camera conversion companies:

www.protechrepairs.co.uk	(this is the company which converted my own camera, to 830nm)
advancedcameraservices.co.uk	(filter descriptions above taken from this website)

Applications for Infrared Photography

Forensics
Infra-red can be used to image many things which are not visible to the naked eye, or to a conventional camera. Infra-red has the ability to penetrate the top layer of skin for instance, and can be used to document latent injuries, or tattoos which might not be visible or clear otherwise. Infra-red will also penetrate thin layers of paint and can identify damage, or previous repairs to cars, walls and buildings.
Medical
Blood vessels, bruising and other phenomena which are just below the skin's surface can be imaged using infra-red converted cameras.
Astronomy
Near infra-red photography (NIR) using converted SLR cameras which can image in the range 700nm to 1200nm can be used to improve imaging of distant objects as the Doppler Effect will lengthen wavelengths where objects move away from us.

Botanical/Agricultural
Infra-red converted cameras are now widely used to investigate the health of plants, and are used in experiments to measure plant health. Plants with more chlorophyll (vital in the photosynthesis process where plants derive their energy from light) will reflect more infra-red, and can be easily identified using infra-red converted cameras. By looking at fields or forests, we can see how infra-red response, and therefore plant health is distributed across an area. This allows locations where plants are less healthy to be identified, studied and diagnosed. In large scale agriculture this means locally targeted fertilisers can be used, saving money and reducing pollution.

Archaeology
Due to the fact that plants strongly reflect infra-red when healthy, we can use infra-red converted cameras to identify archaeological sites from the air. Aerial photography has long been useful for this, but infra-red can show subtle changes in the health of plants due to the underlying soil depth or other factors, and highlight anomalies which would not be visible with conventional aerial photography.

Conservation of Art and Antiquities.
Our infra-red conversions are in use with many of the world's foremost institutions in the conservation of paintings and art. As infra-red light is able to penetrate the top layers of paint, it can be used to document under-painting, and identify fakes, or study how an artist went about painting the earlier stages of the image. We can provide bespoke imaging packages for conservators and institutions. Get in touch here. Let us guide you through, or if you know what you need, ask us for a quotation.

Nature Photography/Filming.
Our infrared cameras are widely used by various BBC departments, including BBC Nature, Springwatch, science documentaries, and all manner of other media institutions for filming in the dark. If you have seen nice crisp black and white 'night vision' shots, instead of the old fuzzy green image intensifier shots, then these are likely to be from infra-red converted SLR cameras. With the appropriate infra-red lighting you can film in total darkness without disturbing your subject with dazzling visible lighting.

Covert Surveillance
Many military, intelligence, and police agencies use infra-red converted cameras to gather intelligence. Infra-red converted cameras are used in situations where conventional visible light cameras will not work. Just as for nature filming and photography, we can produce "invisible" infra-red LED lighting or specialist flash systems, which when used with infra-red converted cameras can film or photograph in darkness without disturbing the subject. Interestingly, many dark glasses will also become clear in the infra-red spectrum.

text from: advancedcameraservices.co.uk/acs-digital-infra-red-photography