Three Classroom Definitions of Techniques used by Modern Astronomers to gather their Observations of the Universe

imaging The obtaining of 2-dimensional images of the celestial sphere. For about a century since the latter part of the 19th century photographic cameras utilizing emulsion on glass plates dominated. (Film is not rigid enough; it can stretch and warp.) Over the past two decades, electronic cameras, most notably CCDs, have grown to dominance in this observational method. CCD (Charge-coupled device) cameras are superior to photography in sensistivity and in having a linear response to light over a greater range of brightness ("dynamic range"). Photography is less expensive and still offers higher resolution, though CCDs are improving in these regards as well.

spectroscopy Literally "examination of the spectrum." Here, a spectrograph (a spectroscope that records the image) is used to disperse the incoming light into its component wavelengths. The dispersing element in the spectrograph originally was a prism, but in today's spectrographs, diffraction gratings are used. They offer the advantage of dispersing equally all across the spectrum. Prisms disperse more at shorter wavelengths. An actual image of the spectrum is produced by this technique, enabling astronomers to see in detail spectral features, e.g. absorption and emission lines. The intensity at all sensible wavelengths can be measured accurately as well, to produce spectral radiation curves.

photometry Literally "light measure." This technique measures the quantity (brightness) of light, almost always with a filter, in order to determine the intensity at various regions of the spectrum. Photoelectric photometers, which convert light to electricity, have taken over from photography's dominance in this techniques as late as the mid-century. As with CCD cameras, photoelectric photometers are more sensitive to light and respond linearly to light over a greater dynamic range. These readings are converted to magnitudes. If mostly yellow is allowed through the filter, the apparent visual magnitude is determined. If a red filter is used (blocks all other wavelengths), then a red magnitude is determined. Likewise for blue, infrared, etc. filters. Subtracting color magnitudes, for example, blue (B) minus yellow / visual (V), or simply B-V, then what we call a color index results. Color indices are far more accurate determinations of the color, and hence, temperature of a star than the human eye can see.