SURP Computing Course Homework for Amy Xiao

1) Download some data of different types from the Open Supernova Catalogue.
The identifiers "Ia", "II P" etc. give information on the supernova type.

Some ones you might want to look at are:

https://sne.space/sne/SN2007jg/

https://sne.space/sne/SN2007ld/

The left hand figures show the light curves and the right hand side give the spectrum, which is the flux as a function of wavelength or frequency.

The first thing to do is to integrate the spectra to obtain magnitudes in certain wavebands.
The SDSS filter transmission curves (which describes the width of the different filters and how much flux they let through) are specified here:

http://svo2.cab.inta-csic.es/svo/theory/fps3/index.php?mode=browse&gname=SLOAN

Integrate the spectra of the SNe above (or other ones) to obtain magnitudes. Do they match the magnitudes in the left hand plot? You may have to correct for an overall offset, or calibration. What is that calibration if any? Is it constant across the filters?

2) Download Peter Nugent's supernova templates (https://c3.lbl.gov/nugent/nugent_templates.html)

You'll notice that some of the types are similar to the SN designations you have in the data above.

Plot the light curve templates on top of the data. Do they match the light curve data reasonably well by eye?

Compute the chi^2 of the model templates to the data. Can you show quantitatively that the template for the Type II is a better match to the Type II data than the template for the Type Ia?

3) Now download sncosmo (https://github.com/sncosmo/sncosmo) and follow some of the tutorials where they do this crude fitting in a much more sophisticated way and discuss SN cosmology.