Observational Properties of Stars

Distance (Trig parallax)
Motions (radial velocity & Doppler effect) (Proper motion)
Radiation Laws
Brightness (apparent and absolute magnitude) distance modulus equation
Atomic Structure and atomic spectra
   Kirchoff’s laws – continuous spectrum, emission line spectrum, absorption line spectrum (see Ch. 3)
Spectra of stars – classification spectral type and luminosity class
Masses and sizes from binary stars
The HR Diagram – stellar populations

The Sun – example of a normal star

Solar/stellar atmosphere
   Photosphere
   Chromosphere
   Corona
   Solar wind
   Solar activity cycle
      Sunspots & sunspot cycle
      Prominences
      Flares
      Aurora & magnetic storm in Earth’s atmosphere

Solar/stellar interiors
   Nuclear fusion (proton-proton chain)
   Hydrostatic equilibrium
   Thermal equilibrium

Stellar Evolution

A. Interstellar Medium and star formation
   Gas and dust
      Dark nebulae – extinction & reddening of starlight
      Emission nebulae/HII regions
   Regions of star formation
   Protostar
   Premain sequence star
B. Low mass stars <2-3\( M_\odot \)
   Main sequence – energy source and structural change
   Post main sequence
      Red giant – energy source, structural change
   Planetary Nebula
   White dwarf – electron degeneracy, novae

C. Massive stars >5-10\( M_\odot \)
   Main sequence – red supergiant
   Energy sources and nucleosynthesis in core of star
   Supernova!
   Enrichment of IS medium
   SN1987A
   Crab Nebula
   Neutron stars and pulsars (neutron degeneracy)
   Black holes – event horizon=Schwarzchild radius
      Singularity
   Observational evidence – X-ray binaries

Variable Stars
   Pulsational Variable
   Period – Luminosity Relation
      RR Lyrae
      Cepheids

Observational Tests
   clusters – open and globular clusters
      Ages – main sequence turnoff
   Distances – main sequence fitting