Ay 101 Fall term 2023-2024
This was the 2022-2023 schedule, with 2023-2024 quite similar
Professor Hillenbrand

Topics and Schedule

The course agenda below is subject to changes as we go along.
It may include more topics/material than we actually cover in class.

Week	Topics
#1 Sep 26+ (first class on 28th)	Introduction - Observed and inferred properties of stars - The HR diagram: Evolution of stars on Myr to Gyr timescales
#2 Oct 3+	Stars as Gases - Composition - Neutral, ionized states - Distribution functions ==> Energy, Pressure - Review of thermal physics - Equations of state (EOS) - The rho-T diagram Stars as Gravitationally Bound Objects - Virial Theorem and Virial Equilibrium
#3 Oct 10+	- Hydrostatic Equilibrium (HSE) - Stellar Timescales Stellar Energy Sources - Free-fall collapse to pre-main sequence - Nuclear reactions - Thermal Equilibrium

Ay 101 Fall term 2023-2024
This was the 2022-2023 schedule, with 2023-2024 quite similar
Professor Hillenbrand

#4 Oct 17+	Energy Transport in Stars - Stellar opacity at high temperatures and Rosseland Mean - Conductive transport - Radiative transport - Convective transport ==> Mixing Length
#5 Oct 24+ **(lecture on 26th by video)**	The Equations of Stellar Structure - Summary of the four equations + assumed EOS - Numerical solutions - Polytropic solutions (across the HR diagram)
#6 Oct 31+	The Main Sequence for Stars of Different Mass - Homology Relations - Main sequence hydrogen burning Principles of Stellar Evolution - Stellar evolution as the quest to maintain HSE - Transition to helium burning - Advanced nuclear burning stages
#7 Nov 7+	Post-Main Sequence Evolution - Low-mass stars through planetary nebula phase - High-mass stars through supernova phase - Stellar remnants (white dwarfs, neutron stars, black holes)

Ay 101 Fall term 2023-2024
This was the 2022-2023 schedule, with 2023-2024 quite similar
Professor Hillenbrand

#8 Nov 14+	Stellar Atmospheres - The Tau < 1 structure of stars - Stellar opacity at low temperatures and Rosseland Mean - Radiative transfer terminology - Equation of radiative transfer - Plane parallel atmosphere - Gray and non-gray atmospheres
#9 Nov 21+ (no class on 25th)	Spectral LInes - Atomic Excitation/Ionization; Einstein Coefficients - Line opacity - Line structure and broadening mechanisms - Line equivalent width and curve of growth - Diagnostics of stellar temperature, gravity, and abundance
#10 Nov 28+	Possible Additional Topics - Stellar Remnants (did not actually cover in week 7) - Pulsation / Asteroseismology (**MG: 15**; LB: 5.7; HKT: 2.10, 8, KWW: 25, 40-42) - Rotation (KWW: 43-45) - Stellar Winds and Mass Loss (HKT: 2.3.2; KWW: 9) - Chemically Peculiar Stars (LB: 7) - Stellar Chromospheres and Coronae - Close Binaries and Accreting systems (**MG: 18, 19, 20;** HKT: 2.13) - Review
#11 Dec 5+	Exam Week