

ASTR/PHYS 2500 Midterm 1 Study Guide

Comprehensive up through Chapter 13 (that we covered)

Night Sky / Coordinates

- How does the night sky change based on your location on the Earth?
- Why do stars rise at different times during the year?
- What causes the seasons?
- How do lunar phases work?

Kepler, Newton, and Orbits

- What are Kepler's 3 laws?
- How does the most general form of Kepler's 3rd law result in $P^2 = a^3$?
- How does Newtonian gravity work?
- How does the energy of binary system determine the orbit of a planet?
- How does its strength depend on the separation of massive bodies?
- What is escape velocity?
- How do you design a Hohmann transfer orbit?

Light

- What are the different wavelength regimes (radio, X-ray, etc.) of the electromagnetic spectrum?
- What is the difference between a blackbody spectrum, emission lines, and absorption lines? How are they produced?
- How are these spectral features produced (i.e., Kirchoff's laws)
- How do you calculate the wavelength of an absorption or emission line?
- What are the atomic processes that produce lines?
- What is the Doppler shift? How does it cause light to get redshifted and blueshifted?
- What are the different line broadening mechanisms?

Solar System and Exoplanet Detection Methods

- How is mass distributed in the solar system?
- What is the general temperature and density structure of the Sun?
- Explain limb darkening.
- Why do planets form in disks?
- What techniques do we use to find planets around other stars?
- How do they work and what do they tell us about exoplanet systems.
- What selection effects operate for each detection method?

Stars

- What does the spectrum of a star look like?
- How do we identify the elements that make up a star?
- What is flux and luminosity, and how are they related?
- What determines how luminous a star is? How is luminosity related to color and size?
- What is parallax and how does it work?
- What are apparent and absolute magnitudes, and how do they relate to a star's distance?
- How are stellar masses, radii, and temperatures estimated?