ASTR 1120 – Study Guide – Final Exam

The Final Exam will cover primarily Week 5 material on cosmology and the origins of the universe. It will include questions that build on material covered in previous weeks. Additionally, it will include some questions exclusively from material covered in previous weeks.

General studying strategy: Topics that we've covered in detail and have repeated multiple times are much more likely to show up on the exam than minutiae that were only glossed over in lecture. In particular, topics that were covered in lecture, lecture tutorial, and on the homework are the most important.

Chapters covered:
14 – Our Star, The Sun
15 – Surveying the Stars
16 – Star Birth
17 – Star Stuff
18 – The Bizarre Stellar Graveyard
19 – Our Galaxy
20 – Galaxies and the Foundation of Modern Cosmology
21 – Galaxy Evolution
22 – Dark Energy and the Fate of the Universe
23 – The Beginning of Time

Major topics:
- Motion of matter: Gravity and conservation of angular momentum
- Behavior of light: Types of spectra, Doppler shift, atoms and light
- The Distance Ladder: Radar, Parallax, Main-sequence fitting, Cepheid variables and other standard candles
- The Sun
- Stars: Young (proto) stars, the main sequence, high and low mass stars, the stellar aging process
- Stellar death: Supernovae, planetary nebulae, white dwarfs, neutron stars, black holes
- The Star-Gas-Star cycle: Molecular Clouds, Collapse into protostars, recycling by supernovae and planetary nebulae
- The Milky Way: Composition of a galaxy (halo, bulge, disk)
- Galaxies: Morphological classification (spiral, elliptical, irregular)
- Galaxy evolution: Formation of galaxies, mergers, starbursts
- Dark Matter: Detection methods (rotation curves, lensing)
- Galaxy Clusters: Composition (hot gas, galaxies, dark matter), use as lenses
- Large Scale Structure: What are voids and filaments?

COSMOLOGY:
- Expansion of the Universe
- The Cosmic Microwave Background
- The composition of the universe
- Olber's Paradox
- The Big Bang and stages of the formation of the universe
- Inflation
- Dark Energy
- The Fate of the Universe
- Special Relativity – the finite speed of light
- General Relativity – shapes of the universe