

REVIEW SHEET: Exam 1; February 16, 2009; ASTRO 305 ; Life in the Universe

A Universe of Life (Chapters 1 & 3)

- Know the relative sizes of the components of the universe (Fig. 3.1)
- What is a galaxy, a cluster of galaxies, a group of galaxies, etc.
- Know the main components of our Galaxy
- Study Fig 3.6 and know how the recycling of stars are linked to life
- Know the origin of the chemical elements of life; nuclear fusion
- Know the structure and components of atoms (Figs. 3.23 and 3.24)
- Know the structure of our solar system (Fig. 3.15)
- Know how we think planetary systems form (Figs. 3.19, 3.21 and 3.22)
- Understand why biology could be universal (three lines of evidence, Fig. 1.3)
- Light and the electromagnetic spectrum (Figs. 3.28, 3.29, and 3.30)
- Lightyear (p55); Lookback time (p67) ; starstuff; three phases of matter (p83)

The Science of Life in the Universe (Chapter 2)

- The heliocentric model and geocentric models of the universe
- The contributions of Aristotle, Ptolemy, Copernicus, Tycho, Kepler, Galileo
- Retrograde motion, its role in “pushing” models toward hypothesis-driven science
- Newton’s Law of Gravity (Fig. 2.15)
- Kepler’s 1st and 2nd Laws of planetary motion (Figs. 2.7 and 2.8)
- The steps of hypothesis-driven science (Fig. 2.13)
- Greek thought that pervade today's science methods
- Hypothesis, Theory, Hallmarks of Science (Fig. 2.14), Occam’s Razor (p35)

The Nature of Life on Earth (Chapter 5)

- Know the six (6) defining properties of life (Fig 5.1)
- Be able to explain Darwin’s Inescapable Conclusion (pp155-156)
- Why are Living Cells carbon-based. Why not oxygen? Why not silicon?
- Be familiar with organic molecules and hydrocarbons; what is a chemical bond?
- Chirality, or Handedness (Fig 5.9)
- The three domains of life: Bacteria, Archea, and Eukarya, which are we?
- Four (4) basic cell molecular components to life: Carbohydrates, Lipids, Proteins, Nucleic Acid (pp163-164)
- Two basic cell type: Prokaryotes and Eukaryotes; be able to compare and contrast
- Cell metabolism; Know the four metabolic classifications (Table 5.1)
- Know DNA structure, heredity, replication; The four DNA bases (A, G, T, C)
- Understand what is meant by “Extremophiles”

The Drake Equation (Chapter 12; part of)

- Know each of the terms; which is the most uncertain term and why?
- What does the Drake Equation estimate?
- How do we estimate L?
- Why does Drake believe $N=L$, or “NEQLSL”