SCIENCE

An Introduction to Astronomy

I. FOUNDATIONS OF ASTRONOMY 25%
   A. The History of Modern Astronomy
      1. Ancient Astronomy
      2. Astronomy in Ancient Greece
      3. The Copernican Revolution
      4. Kepler's Laws of Planetary Motion
      5. Gravitation
         a. Galileo's Observations
      6. Newton's Laws
   B. Light
      1. Electromagnetic Radiation
      2. Wave Properties
      3. The Electromagnetic Spectrum
         a. Lower-Frequency Radiation
         b. Higher-Frequency Radiation
         c. The Visible Spectrum
      4. Thermal Radiation
   C. THE SPACE RACE: *SPUTNIK 1*
   D. Telescopes
      1. Optical Astronomy
      2. Radio Astronomy
      3. Infrared Astronomy
      4. Ultraviolet, X-Ray, and Gamma Ray Astronomy
   E. THE SPACE RACE: *EXPLORER 1*

II. THE STARS 25%
   A. Distances to Stars
   B. Stellar Spectra
      1. Spectral Lines and Spectroscopy
         a. Atomic Structure
         b. Atomic Energy Levels
         c. Emission Spectra
         d. Absorption Spectra
         e. The Doppler Effect
      2. Spectral Classes
      3. Luminosity
         a. Apparent and Absolute Magnitude
      4. The Hertzsprung-Russell Diagram
   C. THE SPACE RACE: YURI GAGARIN BECOMES THE FIRST PERSON IN SPACE
   D. THE SPACE RACE: PRESIDENT KENNEDY ANNOUNCES THE MOON SHOT

E. The Sun
    1. Structure and Composition
    2. Sunspots and Activity Cycles
    3. Other Solar Activity
        a. Solar Flares, Prominences, and Coronal Mass Ejections
        b. Solar Wind
F. THE SPACE RACE: JOHN GLENN ORBITS THE EARTH
G. Stellar Evolution
    1. Life Cycles of Stars
        a. Birth of Stars
        b. Why Stars Shine
H. THE SPACE RACE: THE GEMINI PROGRAM
I. Supernovae, Superdense Stars, and Black Holes
    1. Supernovae
    2. Neutron Stars and Pulsars
    3. Black Holes

III. THE PLANETS 25%
A. The Solar System
    1. About the Solar System
    2. The Formation of the Solar System
B. THE SPACE RACE: THE EARLY APOLLO MISSIONS
C. The Earth and the Moon
    1. Earth's Physical Properties and Structure
    2. Earth's Atmosphere
    3. The Moon
        a. The Surface of the Moon
    4. Tides and Gravity
D. THE SPACE RACE: THE *APOLLO 11* MOON LANDING
E. The Terrestrial Planets
    1. Mercury
    2. Venus
    3. Mars
        a. Mars' Surface
        b. Mars' Moons
        c. Exploration of Mars
F. The Jovian Planets and Beyond
    1. Jupiter and Saturn
        a. Jupiter
        b. Jupiter's Moons
        c. Saturn
        d. Saturn's Moons
    2. Uranus and Neptune
        a. Uranus
        b. Uranus's Moons
        c. Neptune

d. Neptune's Moons
3. Plutoids and the Kuiper Belt
4. Asteroids, Comets, and Meteoroids
    a. Asteroids
    b. Comets
    c. Meteoroids

IV. GALAXIES AND THE UNIVERSE 25%

A. The Milky Way Galaxy
    1. Structure and Properties
    2. Star Clusters
    3. The Interstellar Medium
    4. Mapping Our Galaxy
    5. Star Populations
    6. Age and Formation of Our Galaxy
B. THE SPACE RACE: SKYLAB
C. Other Galaxies
    1. Classification of Galaxies
    2. Galactic Distances and Distribution
    3. Galaxy Clusters
    4. Colliding Galaxies
    5. Active Galaxies
        a. Radio Galaxies
        b. Quasars
D. THE SPACE RACE: THE APOLLO-SOYUZ TEST PROJECT
E. Cosmology
    1. The Expanding Universe
        a. Hubble's Law
        b. The Big Bang Theory
        c. Observational Tests
        d. Cosmic Microwave Background Radiation
    2. Twenty-First-Century Cosmology
        a. Cosmic Acceleration
        b. Models of Expansion
        c. Big Bang Questions
        d. Age and Size of the Universe