Astronomy 201a: STELLAR & PLANETARY ASTROPHYSICS

Instructor:  
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Time: Tu, Th 10:00-11:30  
Web-page: http://cfa-www.harvard.edu/~sasselov/astro201a/

Introduction and Overview (1 lecture)  
Sept. 23  
Stars in the Context of Structure Formation and Nucleosynthesis in the Universe
Planets in the Context of Stellar Evolution

Thermodynamic Properties of the Stellar & Planetary Interior (2 lectures)  
Sept. 28, 30  
The Ideal Gas with Radiation
The Ionized Real Gas
Degenerate Matter
The Equation of State/Crystallization/Neutronization

Nuclear Processes and Burning Stages (1)  
Oct. 5  
Basic Nuclear Physics; Nuclear Reactions
Burning Stages

Energy Transport (6)  
Oct. 7-26  
Radiative Transfer - Inside and Out (1)  
Oct. 7
Convection (2)  
Oct. 12, 14
Stellar Stability & Acoustics (1)  
Oct. 19
Through the Upper Boundary: Stellar Atmospheres (1)  
Oct. 21
The Atmospheres of Brown Dwarfs and Planets (1)  
Oct. 26

Stellar Models: Structure and Evolution of Lower Mass Stars (3)  
Oct. 28, Nov. 2, 4
From the ZAMS to the Present - The Standard Solar Model
Asteroseismology - Successes & Challenges
Late Stages

Planetary Models: Structure and Evolution (3)  
Nov. 9, 18, 23
Gas Giant Planets
Hot Jupiters & Very Hot Jupiters
Terrestrial Planets, Ocean Planets

Stellar Models: Structure and Evolution of Massive Stars (2)  
Nov. 30, Dec. 2
Advanced Burning Stages
Supernovae & Explosive Nuclear Burning
Neutron Stars & White Dwarfs

Chemical Evolution of the Galaxy and the Universe (2)  
Dec. 7, 9
Galactic Evolution, Stellar Yields, & Cosmochronology
Metal Enrichment Patterns from High Redshift to Present
Stellar Population Synthesis and Primordial Galaxies

Recent Developments in Extra-Solar Planets Research (2)  
Dec. 14, 16
Characterization of Hot Jupiters
Planet Formation Theory

Reading Material:

**Grading:**
40% final exam, 50% problem sets, 10% participation (journal review).