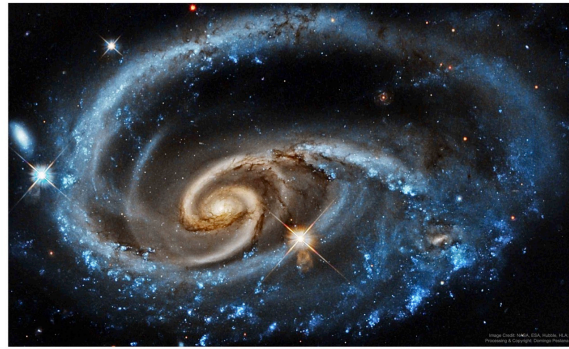


**Astronomy S120**  
**"Galaxies and the Universe"**  
Summer Session A 2018  
Professor Jeff Kenney  
MTWTF 3:00-4:15  
jeff.kenney@yale.edu



An introduction to stars and stellar evolution, the structure and evolution of the Milky Way Galaxy and other galaxies; quasars, active galactic nuclei, and supermassive black holes; cosmology and the expanding universe. No prerequisite other than a working knowledge of elementary algebra. Counts for QR or Sc credit.  
***Intended for non-science majors.***

**Lectures:**

Our Location in Space and Time  
Gravity and Newton's Laws  
Nearly All the Clues Come From Light  
Blackbody Radiation  
Light and Atoms  
What is a Star & The Energy Source of Stars  
The Masses and Lifetimes of Stars  
Life Cycles of Stars & the Importance of Massive Stars  
Measuring Distances in the Universe  
The Discovery of the Milky Way Galaxy  
Varieties of Galaxies  
Motions of Stars and Gas in Galaxies & the Doppler Shift  
Dark Matter in Galaxies  
Clusters, Superclusters & Galaxy Interactions  
Relativity & Supermassive Black Holes I  
Relativity & Supermassive Black Holes II  
Relativity & Supermassive Black Holes III  
Quasars & Other Active Galactic Nuclei  
Introduction to Cosmology & The Expanding Universe  
Age & Fate of the Universe  
Events Over Cosmic Time  
The Microwave Background Radiation  
Microwave Background  
The Curvature of Space & Dark Energy  
The Big Bang! & The Early Universe

**Grading:**

25% Mid-term Exam

30% Final Exam

25% Homework (~10 assignments)

10% Reading Quizzes

5% Attendance

5% Observing Session (at Leitner Observatory)

**Textbook:**

Freedman & Geller & Kaufmann, *Universe* 10th edition (2014)(\$178) ISBN-13: 978-1-319-04238-7 some available at The Yale Bookstore or on Amazon.

OR...

e-book version The e-book (LaunchPad) price (\$86) is 50% of the full price of a new printed textbook, and gives 6 month access. I urge students to purchase LaunchPad, as this gives access to additional online material that I will assign. In addition, you may choose to purchase a paper text (10th or 9th or 8th edition). It seems that new paper versions of the 10th edition are scarce, so used or earlier editions (9th or 8th) will be fine.