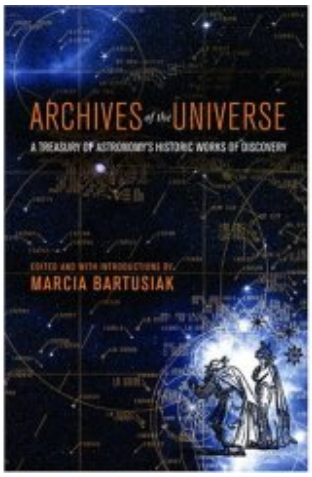
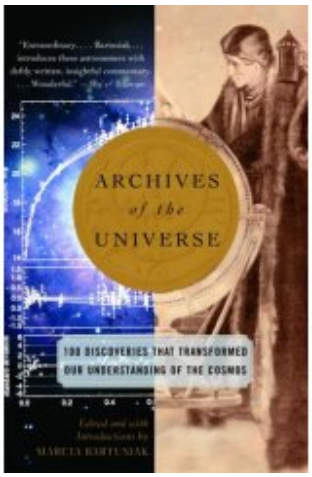
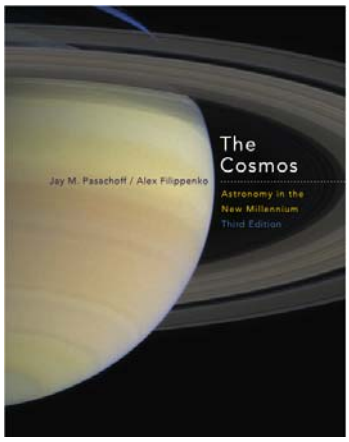
Great Discoveries in Astronomy and Astrophysics 171.112

How did we come to know what we know about the Universe?
This course will focus on key discoveries in astronomy and astrophysics from the speed of light to the speed of the expanding and now accelerating Universe, from the discovery of Neptune to the modern detection of extrasolar planets, spanning hundreds of years and many orders of magnitude of astronomical breakthroughs. For each topic we will review the underlying science principles, the historic context of the discovery, the original discovery work itself, and how it is understood today. Through this course students will gain an understanding of not only how the Universe works
but also the process by which we come to understand it.







Wikipedia.com

Week of:
Jan 22 Introduction & Basics -knowns, unknowns and known unknowns-sec I-II
Early telescopes, early understanding, objects, etc
An Early Model Emerges
Jan 29 13. Binary Stars, 14. Speed of Light, 19. Distance to a Star-parallax
Feb 5 20. Discovery of Neptune Stars, Stars, Stars 27. Stellar Classification, 28. Giant Stars and Dwarf Stars
Feb 12 30. Stellar Mass, Luminosity, and Stability, 43. Source of Stellar Power
Feb 19 46. Creating Elements in the Stars, 47. A Star's Life Cycle
STUDENT PROJECTS BEGIN
Feb 26th Cosmology: Refining the Big Picture 48. Cepheids: The Cosmic Standard Candles, 49. Sun's Place in the Milky Way
March 5 51. Discovery of Other Galaxies, 52. Expansion of the Universe
March 12 Spring Break!
March 19 53. Black Holes (RV) , Exam
March 26 37. Relativistic Models of the Universe 63. Evidence for the Big Bang,
April 2 62 Quasars 69. Dark Matter
April 9 73. Galaxy Evolution and the HDF (HF) , 74. Extrasolar Planets (JV)
April 16 75. The Accelerating Universe I and II
April 23 67 Gamma-Ray Bursts (AF) and Project Overflow

Possible Extras if Time Permits: "Hubble Telescope Greatest Discoveries" (ML) and WMAP (CB)

Final Exam

Course Information

Lectures

Lectures meet Monday at Wednesday at 10am in the Bloomberg Auditorium.
The format of the Tuesday-at-10am slot will vary from lecture to student-led projects.
The course website will be http://braeburn.pha.jhu.edu/~ariess/disco

Reading

There is a required text for the course:
Archives of the Universe, by Marcia Bartusiak
and two suggested texts:
The Cosmos, by Pasachoff and Filippenko
and
Coming of Age in the Milky Way, by Timothy Ferris

Course Requirements

Students are expected to attend the lectures as many interesting points will be made by the professor or your classmates during the lectures. It is even possible that a "Great Discovery" will be made in class and if you are not there you will miss it, not be a co-author of the discovery paper, and you will not be invited to go to Stockholm to collect your share of the Nobel Prize. Students are expected to hand in the homework on time, read the assigned text, participate, take the exams, and complete the Project. The Project is to select one of the discovery chapters in "Archives" not extensively covered in class (see list below), present it in a short, 20-25 minute lecture to the class on a designated Tuesday (between Feb 26th and April 24th), and turn in a 5 page paper the week of April 23rd.

Homework:

Doing and understanding the homework is important to get the most out of the class and to prepare yourself for the exams. It should not take too long to complete. Homework is due at the assigned time. Greatly reduced credit, if any, will be given for late homework. It is OK to consult with others on homework, but it is NOT OK to copy someone else's work. Solutions and answers must be expressed by each individual seeking full credit. I will drop your lowest homework grade, so that will allow you to miss one week.
At least one homework exercise will involve making an observation from the telescope on the roof of the Physics and Astronomy building.

To summarize:

Reading assignments
Homework sets
Mid-term Exam
Short presentation
Final Exam

Grading:

Homework 20%
Participation 15%
Midterm 20%
Final Project 25%
Final Exam 20%

Staff:

Adam Riess
Bloomberg room 207
ariess@stsci.edu

I am a new professor and this is a new course so please bear with me as I try to figure out the mechanics of the course and I welcome suggestions! Some of the course mechanics may be amended during the semester as I seek to improve the experience.

Project Chapters:

Provide your top choice in each group by Monday, Feb 5th

Group 1
2,4,5,18,21
Group 2
25,31,32,33,34
Group 3
41,42,44,50,53
Group 4
54,55,58,59,60
Group 5
61,65,68,70,72

Etc

We are fortunate to be surrounded by some of the world's experts in astronomical discovery (at Johns Hopkins University and across the street at the Space Telescope Science Institute, headquarters of the Hubble Space Telescope). For a few topics for which such an expert is local and known to be an engaging speaker, we will have a guest lecture for that class.