ASTR/PHYS 119
A Companion Course to ASTR/PHYS 109,
"Big Bang and Black Holes"

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Background: ASTR/PHYS 109

Course commonly referred to as “Big Bang, Black Holes, No Math”

- Topics:
  - The Big Bang and Black Holes
  - How are stars formed?
  - What is Dark Matter?
  - What is the evidence for the Big Bang?
  - How did we get from the Bang to the stuff out there we have today?
  - What is Dark Energy?

I gave a talk on this course about a year ago which can be found on the web
http://faculty.physics.tamu.edu/toback/Talks/BBBHNM_Talk_2009_v1.ppt
Goals of ASTR/PHYS 109

Teach non-majors to understand, for example, why we think there was a Big Bang using “Evidence based” decision making.

What’s very different is that:

• No equations or math
• Teach them to “tell the story by describing the evidence”
Now for ASTR/PHYS 119

This is **NOT** a Lab class

- Sorry to start here, but the amount of misunderstanding on this has caused enormous head-ache

  - It's a **companion course** to ASTR/PHYS 109
  - It is **DIFFERENT** than a “traditional” lab course
  - Currently, I call it a “Laboratory Methods” course

    - Better name?
Course Objectives

• The emphasis will be on the interpretation of data and presentation of results to make evidence-based conclusion
• Use only beginning level data analysis techniques
• No emphasis on data taking (no telescopes), pre-packaged data based on real data will be presented in “raw” format in online environment
• The primary goal is for students to gain insight into both the science and the scientific method by processing raw information into evidence for use in making a case, and then presenting that case in a report format

“Big Bang, Black Holes, No Math”
ASTR/PHYS 109 at Texas A&M
Toback, 11/2009
Course Work

- Class meets two hours per week in a computer room
  - Course is a (1-1)
- The bulk of the grade for this course is in the write-ups (90%)
- A premium is placed on the ability to understand, interpret and convey the data that provide evidence for our understanding of cosmology and the physical universe to the lay reader
5 Activities (Topics? Labs?)

1. Boot camp: Learning the tools of the trade
2. What is the Sun made of?
3. How do galaxies move? Hubble Expansion
4. What if the Sun turned into a Black Hole?
5. What’s the evidence for Dark Matter?
3 Class Periods Per Topic
+ 1 Paper

- Class 1: Collect “Data” and start analysis
- Class 2: Complete analysis and start working on write-up
- Class 3: Bring solid draft (written at home) and review in editor/author pairs with rubric
- Final write-up due before next class period
Typical Write Up

• **Format:**
  - Objectives
  - Procedure
  - Data
  - Results
  - Conclusions
    - About 5 to 6 pages double spaced, including figures and tables

• **Example Write up**

• Studies show the students report $9 \pm 4$ hours spent between in-class and out-of-class time
Next

• Class already approved by departmental Undergraduate Curriculum Committee
• College level UCC seeks input from the Astronomy group
  - Do they fully support the course?
• Hope to address any concerns and move to University UCC so the course (currently ASTR/PHYS 289) can be re-titled as ASTR/PHYS 119 and made available as a Tier 2 Science course for non-majors to increase enrollment
Want more info?

Course Site:

- [http://faculty.physics.tamu.edu/toback/289/](http://faculty.physics.tamu.edu/toback/289/)

Fun example of the expansion of the Universe

- [http://faculty.physics.tamu.edu/toback/289/lab/Lab2/Lab2_partIII.html](http://faculty.physics.tamu.edu/toback/289/lab/Lab2/Lab2_partIII.html)
End of Talk